

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME OF INSTRUCTION AND SYLLABI OF B.Tech.  
PROGRAM

RGUKT, Basar

**III YEAR  
II SEMESTER**

<b>Subject Code</b>	<b>Course Name</b>	<b>L-T-P</b>	<b>Credits</b>
CS3201	Principle of Programming Languages	4-0-0	4
CS3202	Linux Programming	4-0-0	4
CS3203	Data Mining	4-0-0	4
CS3204	Computer Networks	4-0-0	4
CS3205	Software Engineering	4-0-0	4
HS3201	Soft Skills	2-0-0	1
CS3803	Data Mining Lab	0-0-3	2
CS3805	Software Engineering Lab	0-0-3	2
CS3902	Seminar-III		1
CS3000	Comprehensive Viva-I		1
	Total	22-0-6	27

**L-Lectures, T-Tutorials, P-Practicals, C-Credits**

**CS3201**

**PRINCIPLE OF PROGRAMMING LANGUAGES**

**Externals: 60Marks**

**Internals: 40Marks**

**L-T-P-C**

**4-0-0-4**

**Objectives:**

- To provide an overview of the key paradigms used in developing modern programming languages.
- To explore the implementation details of languages to provide an understanding of the source program and its execution behavior.

**UNIT I:**

Introduction – Role of programming languages - Programming domains - Language evaluation criteria - Influence on language design - Implementation methods - Virtual computers – Bindings  
Concept of binding.

**UNIT-II:**

Data types - Implementation of data types - Primitive, User defined – Names –Variables – Type checking- Strong Typing - Type compatibility -Scope – Lifetime - Referencing environments  
Named constants – Virtualization - Heap management.

**UNIT-III:**

Expressions, Assignments and Control Structures. Arithmetic expressions – Assignment statements - Compound statements - Selection statements - Iterative statements – Unconditional branching – Guarded commands.

**UNIT-IV:**

Subprograms-Fundamentals-Design issues-Local Referencing Environment-Parameter passing methods –Subprogram names as parameters – Overloaded Subprograms – Generic Subprograms –Separate & independent compilation – Design issues for functions – Accessing non-local environments – User defined overloaded operators – Co-routines.

**UNIT-V:**

Implementation of Subprograms – General semantics of calls & returns- Activation Records – Blocks – Recursion Exceptions and Programming Paradigms - Exception handling in C++, Java, PL/I, Ada ,Fundamentals of Functional programming language – Examples – LISP Interpreter - Overview of Logic programming - Basic elements of Prolog.

**Suggested References:**

1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education, 2008.
2. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech, rp-2007.

**CS3202**

## **LINUX PROGRAMMING**

**Externals: 60Marks**

**Internals: 40Marks**

**L-T-P-C**

**4-0-0-4**

### **Objectives:**

- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- To familiarize students with basic Linux administration

### **UNIT - I:**

**Linux Utilities**-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.Sed-Scripts, Operation, Addresses, Commands, awk-Execution, Fields and Records,Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions.

### **UNIT - II:**

**Files and Directories**- File Concept, File types, File System Structure, file metadata-Inodes, kernel support for files, system calls for file I/O operations- open, create, read, write, close, lseek, dup2, file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod, file ownership-chown, lchown, links-soft and hard links - symlink, link, unlink. Directories-Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions.

### **UNIT - III:**

**Process** - Process concept, Layout of a C program image in main memory. Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.Signals - Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

### **UNIT - IV:**

**Interprocess Communication** - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs- creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes,popen and pclose library functions. Message Queues- Kernel support for messages, APIs for message queues, client/server example. Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

**UNIT - V:**

**Shared Memory-** Kernel support for shared memory, APIs for shared memory, shared memory example. **Sockets-** Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (unix domain and Internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Socket options-set sockopt and fcntl system calls, Comparison of IPC mechanisms.

**Suggested References:**

1. Unix System Programming using C++, T. Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Unix Network Programming, W. R. Stevens, PHI.

**Externals: 60Marks****Internals: 40Marks****L-T-P-C****4-0-0-4****Objectives:**

- To impart an introduction to Data Mining.
- To develop basic knowledge of how data is transformed to Data Warehouses.

**UNIT – I:**

**Introduction to Data Mining:** What is data mining? Related technologies - Machine Learning, DBMS, OLAP and Statistics. Data Mining Goals, Stages of the Data Mining Process , Data Mining Techniques. Knowledge Representation Methods, Applications. Example: weather data

**Data Warehouse and OLAP:** Data Warehouse and DBMS, Multidimensional data model , OLAP operations, Example: loan data set.

**UNIT – II:**

**Data preprocessing:** Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies. Installing Weka 3 Data Mining System. Experiments with Weka - filters, discretization.

**Data mining knowledge representation :** Task relevant data, Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques, Experiments with Weka – visualization.

**Attribute-oriented analysis:** Attribute generalization, Attribute relevance, Class comparison, Statistical measures, Experiments with Weka - using filters and statistics

**UNIT – III:**

**Data mining algorithms: Association rules** - Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis. Experiments with Weka - mining association rules.

**Data mining algorithms: Classification** - Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules, Experiments with Weka - decision trees, rules

**UNIT – IV:**

**Data mining algorithms: Prediction** - The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models, Experiments with Weka-Prediction

**Evaluating what's been learned:** Basic issues, Training and testing, Estimating classifier accuracy (holdout, cross-validation, leave-one-out), Combining multiple models (bagging, boosting, stacking), Minimum Description Length Principle (MLD), Experiments with Weka - training and testing

## **UNIT – V:**

**Clustering:** Basic issues in clustering, First conceptual clustering system: Cluster/2 , Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Conceptual clustering: Cobweb, Experiments with Weka - k-means, EM, Cobweb

**Advanced techniques, Data Mining software and applications:** Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). Bayesian approach to classifying text

Web mining: classifying web pages, extracting knowledge from the web. Data Mining software and applications

### **Suggested References:**

1. I. H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.
2. J. Han and M. Kamber. Data Mining: Concepts and Techniques, 2nd Ed. Morgan Kaufman. 2006.
3. M. H. Dunham. Data Mining: Introductory and Advanced Topics. Pearson Education. 2001.
4. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001.
5. Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining. Addison-Wesley Longman Publishing Co.

**Externals: 60Marks****Internals: 40Marks****L-T-P-C****4-0-0-4****Objectives:**

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To introduce UDP and TCP Models.

**UNIT - I:**

**Overview of the Internet:** Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

**Physical Layer:** Guided transmission media, wireless transmission media.

**Data Link Layer:** design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.

**UNIT - II:**

**Multi Access Protocols:** ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

**UNIT-III:**

**Network Layer:** Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

**UNIT-IV:**

**Internetworking:** Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.

**Transport Layer:** Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

**UNIT-V:**

**The Internet Transport Protocols:** UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection



Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

**Application Layer:** Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

**Suggested References:**

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.
3. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
4. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
5. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
6. Computer Networks, L. L. Peterson and B. S. Davie, 4th edition, ELSEVIER.
7. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

**CS3205**

**SOFTWARE ENGINEERING**

**Externals: 60Marks**

**Internals: 40Marks**

**L-T-P-C**

**4-0-0-4**

**Objectives:**

- To familiarize the steps in designing a Computer Software System following the conventions in Engineering Design.
- To introduce the fundamentals of Structured and Object Oriented Designs and Design Tools.

**Unit-I:**

The Evolving role of Software – Software – The changing Nature of Software – Legacy software ,Introduction to CASE tools, A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models. Product and Process. Process Models – The Waterfall Model –Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models– Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

**Unit-II:**

Management: Functions - Project planning - Software productivity - Productivity metrics Cost estimation - COCOMO & COCOMO II - Project control - Work breakdown structures, Gantt Charts, PERT charts - Dealing with deviations - Team organization - centralized, de-centralized, mixed - An assessment of organizations - Risk management – Configuration Management. Introduction to project management and planning CASE tools.

**Unit-III:**

Requirements Engineering: Requirements Engineering tasks – Initiating the requirements Engineering Process-Eliciting Requirements – Developing Use cases – Building the Analysis Models– Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements. SRS Document.

**Unit-IV:**

Design activity & its objectives – Function Oriented and Object Oriented Design Modularization techniques - module structure and its representation, interface and information hiding, categories, specific techniques to accommodate change, stepwise refinement, top-down and bottom-up design - Handling anomalies. Case Study with UML and CASE Tool support.

**Unit-V:**

Implementation Techniques - Programming principles and guidelines – Structured Programming. Software Testing Fundamentals-Test Case Design-White-Box Testing-Basis Path Testing-Control Structure Testing- Black-Box Testing- Various levels of Testing: Modules to System. Case study: Test case design and Test log preparation.

**Suggested References:**

1. Software Engineering: A practitioner's Approach, Roger S Pressman, sixth edition. McGraw Hill International Edition, 2005
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education, 2004.

## HS3201

## SOFT SKILLS

**Externals:**

**L-T-P-C\***

**Internals:**

**6-0-0-1**

### **Objectives:**

- To implement practically the skills needed for employment.
- To deal with the society in an acceptable way maintaining ethical standards.
- To make them competent to attempt and qualify in various tests.

### **UNIT-I**

**PPTs** – Introduction - Oral presentation – Power point Presentation – Individual presentation – Group presentation

### **UNIT-III**

**Group Discussions** - Speaking in Group Discussions - Discussing Problems and Solutions - Creating a Cordial and Cooperative Atmosphere - Using Persuasive Strategies - Being Polite and Firm - Turn-taking Strategies - Effective Intervention - Reaching a Decision - **Organizational GD** - Brainstorming - Nominal Group Technique - Delphi Technique - **GD as Part of Selection Process** - Characteristics - Evaluation and Analysis - Approach to Topics and Case Studies

### **UNIT-IV**

**Interviews** – Types of interviews – Body language – Fluency – Etiquettes – Mock interviews

### **UNIT-V**

**Formal Letters and Email** - Introduction - Formats of Written Correspondence - Types of Messages - **Letter Writing** - The Seven Cs of Letter Writing - Purpose - Structure - Layout - Principles - Planning a Letter - **Cover Letters** - Writing the Cover Letter - Academic and Business Cover Letters - Cover Letters Accompanying Résumés - **Emails** - Advantages and Limitations - Style, Structure, and Content - Email Etiquette - Effectiveness and Security

### **Suggested References:**

1. Business Communication – Meenakshi Raman
2. Presenting to Win - Jerry Weissman
3. Boring to Bravo - Kristin Arnold
4. Advanced Presentations by Design- Andrew Abela

**CS3803**

**DATA MINING LAB**

**Externals: 60Marks**

**Internals: 40Marks**

**Objectives:**

- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem

**Experiments:**

1. Dimension reduction techniques to handle multi-dimensional data
2. Practical Machine Learning Tools and Techniques
3. Dimension reduction techniques to handle multi-dimensional data
4. Scalable algorithms for classification and clustering
5. Bayesian Networks

For the detailed list of programs refer the lab manual.

Note: Any experiment according to the syllabus of CS3203 can be substituted

**L-T-P-C**

**0-0-3-2**

**CS3805**

**SOFTWARE ENGINEERING LAB**

**Externals: 60Marks**

**Internals: 40Marks**

**Objectives:**

- Able to prepare SRS document, design document, test cases and software configuration management and risk management related document.
- Develop function oriented and object oriented software design using tools like rational rose.
- Able to perform unit testing and integration testing.
- Apply various white box and black box testing techniques
- Able to track the progress of a project using Openproj tool.

**L-T-P-C**

**0-0-3-2**

**Experiments:**

1. Identifying the Requirements from Problem Statements
2. Estimation of Project Metrics
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios
4. E-R Modeling from the Problem Statements
5. Identifying Domain Classes from the Problem Statements
6. State chart and Activity Modeling
7. Modeling UML Class Diagrams and Sequence diagrams
8. Modeling Data Flow Diagrams
9. Estimation of Test Coverage Metrics and Structural Complexity
10. Designing Test Suites

For the detailed list of programs refer the lab manual.

Note: Any experiment according to the syllabus of CS3205 can be substituted

**CS3902**

**Seminar-III**

**Externals: 100 marks**

**L-T-P-C  
0-0-2-1**

**Objectives:**

- To improve the presentation skills
- To prepare PPT more effectively

Student has to chose a topic related socio-economic matter to give a power point presentation.

**CODE: CS3000**

**COMPREHENSIVE VIVA-I**

**External Exam : 50 Marks**

**Credits : 1**

Students are assessed in the courses they have undergone till the completion of that academic year. They are asked to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills.

There are no sessional marks. The end examination shall be conducted by a committee consisting of an External examiner, Head of the department and two senior faculty members. The evaluation is purely external and it carries marks 50.