T.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester –V
CS– 51 : System Programming

Course outcomes:

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

- organize the functionalities and components of a computer system into different layers, and have a good understanding of the role of system programming and the scope of duties and tasks of a system programmer.
- grasp the concepts and principles, and be familiar with the approaches and methods of developing system-level software (e.g., compiler, and networking software).
- apply the knowledge and techniques learnt to develop solutions to real world problems.

Total credits: 04   **Total lectures: 60**

Course content

1. Introduction to operating system   (4)
Simple monitor, buffering and spooling, I/O memory and CPU protection

2. Functions of operating system   (6)
Services to the user-programs, System Call concept and interrupts

3. File systems   (12)
Types of Files, Structure of a disk, block file operation. Allocation methods, Access methods, Directory structure

4. Scheduling concepts   (12)
Scheduling algorithms First come First, Shortest Job First, preemptive algorithm with example

5. Memory Management   (10)
Relocation, Swapping, Overlap swapping, Multiple partition and segmentation, Paging, Demand paging, page replacement algorithm

6. I/O scheduling   (8)
First come first, Shortest-seeking-first, elevator algorithm. Comparison of algorithm

7. Resource allocation   (8)
Deadlock prevention, Deadlock avoidance, Deadlock and recovery

Reference Books:
1. Operating System By Peterson
2. Operating System Concepts By Galvin, Silberschatz 8th Edition
3. Modern Operating System ,Andrew S. Tanenbaum, , Prentice Hall, 3rd Edition

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T.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester –V

CS- 52: Internet Technologies

Course outcomes:

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

- to understand the terms related to the Internet and how the Internet is changing theworld.
- to understand how computers are connected to the Internet and demonstrate the ability to use the World WideWeb.
- demonstrate an understanding of and the ability to use electronic mail and other internet basedservices
- understand the design principles of Web pages and how they arecreated
- develop an ability to create basic Webpages with HTML.

Total credits: 04   **Total lectures: 60**

Course content

1. **Internet concept**   **(10)**

History & Need of Internet, Http & other protocols, Client/Server Concepts. Need for a common & Simple Language, Internet tools, Internet architecture and packet switching, Internet security,DNS Domain Name Representation

2. Introduction to HTML   **(10)**

Basic Tags, HTML Attributes, Basic Layout, HTML Tag Reference, Document Structure Tags,Formatting Tags, Text Level formatting, List Tags, Hyperlink tags, Image and Image maps, Frame Tags, Executable content tags

3 Style Sheets   **(10)**

Introduction to style sheets, Different approaches to style sheets, Linking to style information in s separate file, Using the <LINK>tag, embedded style information, Using <STYLE> tag, Inline style information.

4. Tables in HTML   **(10)**

Tables Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table.

5. Forms: **(8)**

Creating Forms, The <FORM> tag, Input fields, The <INPUT> tag, Multiple lines text windows, Text, Text Area, Password, Button, Submit, Reset, Radio, Checkbox, Select, Option, XML basics.

6. Java Script basics   **(6)**

Script Basic, data types, operators, Statements ,comments, advantages.

7. Java Script control structures   **(6)**

Break, comment, continue, while loop, for loop, if...else, return, switch, functions.

Reference Books

1. HTML 4 Unleashed (Second Edition) : Techmedia
2. The Complete Reference HTML   : Tata McGRAW-HILL 3rd Edition
3. Begining Web Programming with HTML XML and CSS :JonDuckett

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T.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester –V

CS -53 : Theoretical Computer Science

Course Outcomes :

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

- understand and learn systems thinking, analyze, design them
- implement, and evaluate a computer-based system, process and component
- perform problem-solving efficiently
- explore communication of program to meet desired needs
- enhance teamwork and context awareness

Total credits: 04   **Total lectures: 60**

Course content

1. **Finite automata and regular expressions**   **(15)**
   preliminaries, Finite State Machines, Non-deterministic Finite Automata
   (NFA)Finite Automata with $\in$ Mores, Regular Expressions, Regular Languages
   /Grammars, Finite Automata with output Definition of Moore and Melay
   Machine & Equivalence. Equivalence of Regular Expression and Finite Automata.

2. **Properties of Regular Sets**   **(10)**
   Pumping Lemma for regular sets, Closure properties of regular.
   Minimizing Finite Automata, Myhill-Nercode Theorem.

3. **Context free Grammar**   **(15)**
   Introduction, Types of Grammar, Regular Grammar, Equivalence of regular Grammar
   and Finite Automata, Derivation Trees, Ambiguity. Simplification of Context Free
   Grammars, Removing Useless Symbols and Productions, Chomsky Normal Form,
   Greibach Normal Form.

4. **Push Down Automata**   **(10)**
   Informal Description and Definition. Equivalence of accepted by Final State and
   Empty state Equivalence of PDA and CFL.

5. **Introduction to Turing Machine**   **(10)**
   Basic Turing Machine Model with Simple example for language recognition only.

Reference Books:

1. Introduction to Automata Theory. **-**Hapcraft, Ullman
2. Principles of compiler construction - Aho, Ulman,Sethi
3. Introduction To system software .By D.K Dhamdhere
4. System Programming By john Donovan

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T.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester –V

CS – 54: Programming in Java - I

Learning outcomes:

At the end of the course, a student shall be able to :
- Understand the knowledge of the structure and model of the Java programming language,
- use the Java programming language for various programming technologies
- develop software in the Java programming language
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements

Total credits: 04   **Total lectures: 60**

Course content

1. Introduction to Java   **(6)**

Features of java, JDK Environment & tools like (java, javac, appletviewer, javadoc, jdb)

2 . Object Oriented Programming Concept   **(10)**

Overview of Programming, Paradigm, Classes; Abstraction; Encapsulation; Inheritance; Polymorphism; Difference between C++ and JAVA

3. Java Programming Fundamental   **(10)**

Structure of java program; Data types; Variables; Operators; Keywords; Naming Convention Decision Making (if, switch); Looping (for, while); Type Casting

4. Classes and Objects   **(12)**

Creating Classes and objects; Memory allocation for objects; Constructor; Implementation of Inheritance; Simple; Multilevel; Hierarchical; Implementation of Polymorphism; Method Overloading; Method Overriding; Nested and Inner classes

5 Arrays String and Vector   **(10)**

Arrays; Creating an array; Types of Array; One Dimensional arrays; Two Dimensional array Strings; String – Arrays ,String Methods, String Buffer class, Vectors; Wrapper classes

6. Abstract Class , Interface and Packages   **(10)**

Modifiers and Access Control; Default, public private protected; Abstract classes and methods; Interfaces; Packages

7.Exception Handling   **(2)**

Exception types; Using try catch and Multiple catch; Nested try; throw, throws and finally Creating User defined Exceptions

Reference Books :

       1. Complete reference Java by Herbert Schildt(5th edition)

       2. Java 2 programming black books, Steven Horlzner

       3. Programming with Java , A primer ,Forth edition , By E. Balagurusamy

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T.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester –V

CS – 55 : Software Engineering

Course Outcomes:

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

- basic knowledge and understanding of the analysis and design of complex systems.
- ability to apply software engineering principles and techniques.
- produce efficient, reliable, robust and cost-effective softwaresolutions.
- ability to work as an effective member or leader of software engineeringteams.
- manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals
- identify and analyzes the common threats in each domain.

Total credits: 04   **Total lectures: 60**

Course content

1. **System Concept**   **(06)**
   Definition, Elements of Systems, Types of System, System Boundary, Interface.
2. **Software Development Approaches**: Evolving Role of Software, Software Characteristics, Software Applications.   **(04)**
3. **System Analysis**   **(10)**
   Definition, Role of System Analyst, Requirement, Anticipation, Requirement Investigation, Requirement Specification, Feasibility Study, Fact Finding Methods Interview, Questionnaire, Record review / sampling, observation.
4. **Diagrammatic Representations**   **(06)**
   Context level DFD's 1st & 2nd level DFD's , Functional Decomposition Diagram E-R Model, Study of Physical System Structure Chart
5. **Decision Tools**   **(08)**
   Decision Tree, Decision Table, Structured English.
6. **System Design**   **(08)**
   Normalization, Database Design.I/P Screen Design, O/P formal Design.
7. **System Development Life Cycle**   **(10)**
   SDLC phases, Waterfall Model – Spiral Model, prototyping, incremental model.
8. **Data Dictionary**   **(03)**
   Need of data dictionary, Example, Advantages of data dictionary, qualities of Good Software
9. **Introduction to Software Testing**   **(05)**
   Testing concepts, Principles of software testing , verification and validation. Software Testing Fundamentals, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model-Based Testing.

   Reference Books:
   1. Analysis of Information Systems.- James Senn
   2. Software Engineering.- Rojer Pressman
   3. System Analysis and Design.- Elias Awad

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T.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester –V

CS PIX: Computer Science Practical –IX

Course Outcomes:

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

- develop systematic thinking to analyze, design, implement, and
  evaluate a computer-based system, process, component, or program to meet desired
  needs.
- design and implement Simulator for assembly programs
- understand the interpretation of H/W using low level programs
- implement Macro preprocessor using C language

Total Credits: 2

Practical Examination

A) Internal Marks 40 : Completion of journal , attendance and involvement in activities.
B) Annual examination: Maximum marks: 60 Marks and duration is 3 Hrs .

1. Line Editor

2. Writing Simulator for SMACO and SMACO programs

3. Writing Assembler

4. Interrupt Handler

5. Toy shell

6. MS- Dos patching

7. Writing simple macro –preprocessor

*****

CS PX: Computer Science Practical –X

Course Outcomes:

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

- use knowledge of HTML and CSS code and an HTML editor to create personal and/or business websites .
- use critical thinking skills to design and create websites.
- gain knowledge of JavaScript applications development.

Total Credits : 2

Practical Examination

A) Internal Marks 40 : Completion of journal , attendance and involvement in activities.
B) Annual examination: Maximum marks: 60 Marks and duration is 3 Hrs .

Develop HTML document using following tags:

1. Heading, Body, Text formatting, Paragraph, Listing, Marquee tag

2. Link tags, Anchor, Image tags

3. Table tags

4. Form, Button, combo box, List box, Check box.

5. Developing web pages

6. Cascading Style sheets

7. Frame Layout

8. Audio and video tags

9. XML form

10. Java-script programs based on Control structures

11 Java-script programs based on Function

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CS PXI: Computer Science Practical -XI

Course Outcomes:
At the end of the course, a student shall be able to :
- use concepts of object oriented programming concepts
- learn environment of jdk
- design java program using array and multiple inheritance
- implement exception handling using Java program

Total Credits: 2

Practical Examination

A A) Internal Marks 40 : Completion of journal , attendance and involvement in activities.
B) Annual examination: Maximum marks: 60 Marks and duration is 3 Hrs .

1. Write a java program using control structures

2. Program on class and object creation

3. Method overloading

4. Program using single inheritance

5. Polymorphism

6. Program using array

7. Package

8. Interface

9. Exception Handling.

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CS MI :Mini Project-I

Course Outcomes:

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

- apply of knowledge and techniques learnt in theoretical classes for developing the s/w for real problems.
- get an insight into the working of the real organizations/companies.
- gain deeper understanding in specific functional areas.
- explore career opportunities in their areas of interest.

Total Credits: 2

Guidelines for the Mini Project Formulation

The course Mini Project is one that involves requirement analysis, feasibility analysis, Database design, coding, testing, implementation and maintenance

Every student is required to carry out Mini Project work under the supervision of a Mentor.

The mentor shall monitor progress of the student continuously. A candidate is required to present the progress of the Mini Project work during the semester as per the schedule provided by the Coordinator.

Mini Project Synopsis Content

Mini Project proposal should be prepared in **consultation with the Mentor.** It should clearly state the objectives and environment of the proposed Mini Project to be undertaken. Ensure to include the following items while submitting your Mini Project synopsis.

Mini Project synopsis may contain required number of pages and sequence of contents should be in the following order:

1) Title of the Project
2) Synopsis Approval Performa
3) Index
4) Acknowledgement
5) Introduction and Objective of the Mini Project
6) Analysis (Feasibility Study, DFD 0 -Level, 1- Level and 2 Level/ER Diagram etc)
7) H/W and S/W Requirement
8) Table and Structure, Number of Modules, Detail of Modules, Data Structure
9) Types of Reports
10) Future Scope

Mini Project Report Formulation

The Mini Project may contain 70-100 pages (excluding coding) with double spacing. The project documentation must be with respect to the project only. Mini Project Report should follow the points given below:

1) Cover and Title page
2) Synopsis Approval Certificate/Company Certificate
3) Index
4) Acknowledgement
5) Certificate of Originality

6) Introduction/Aims and Objective
7) System Analysis
7.1 Identification of Need
7.2 Preliminary Investigation
8) Feasibility Study
8.1 Technical Feasibility
8.2 Economic Feasibility
8.3 Operational Feasibility
9) Analysis (Feasibility Study, DFD 0 Level, 1- Level and 2 Level/ER Diagram, and Data structure, Table structure etc).
10) S/W Engineering. Paradigm applied
11) S/W & H/W Requirement Specification
12) System Design
13) Screen Shots
14) Coding
15) Validation Checks
16) Implementation and Maintenance
17) Testing (Testing techniques and Testing strategies)
18) System Security measures
19) Various types of Reports/Modules
20) Pert Chart/Gantt Chart
21) Future scope of the Mini Project (452)
22) Bibliography/References/Glossary
23) Original Copy of the Approved Synopsis

The cover page must be hard bound in *Black Color; with Gold Embossing*.All the students are required to use either Arial / Times New Roman of font size 12throughout the report and in heading and subheadings font size shall be 14 .Two copies of the Mini Project report in bound form is to be prepared by the student(one for the college and one for himself/herself for future reference) All the copies must be duly signed by the in-charge faculty as per the schedule provided to you. One copy of the Mini Project Report must be retained by the student which should be produced before the examiner at the time of the Viva-voice.

The student must bring the soft copy of the projects as desired by the external examiner at the time of the viva voce.Each student is required to make a copy of Mini Project in CD and submit along with his/her Mini Project report.Mini Project can be developed in any language/ platform / package . Students can develop applications using tools/languages/Software which may be in use in their current organization where they may be undertaking the Mini Project(not mandatory)

Mini Project Evaluation
As per the University norms Mini Project Report shall be evaluated by the examiner at the end of the semester. However there will be continuous monitoring of the
Mini Project progress report during the semester and distribution of marks shall be as follows:

Mini Project Evaluation Scheme
Mid Sem.Presentation : 40
End Sem Presentation Viva Project Evaluation: 60

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CS – 56 : Data Communication and Networking- I

Course Outcomes:

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

- get familiar with the basics of computer networks
- understand network architecture and use of various protocols
- explore hardware connectivity, signaling, addressing, network topologies
- learn   network design, switching, management
- security and standards with emphasis on the TCP/IP protocol suite

Total credits: 04   **Total lectures: 60**

Course content

1. **Introduction to Networks and Networking Concepts :**   **(15)**

   Networking fundamentals; Needs of Networking; Local and wide Area Networks; Advantages and disadvantages; A Networking Lexicon; Clients, peers and Servers; The Network Medium Carriers; Network protocols; Network Software; Network Services; Network Types; peer-to-peer networking; Server-based Networking; Storage-area Networking; Hybrid Networks; Hardware requirements; Selecting the right Type of Network; Basics of Communication Networks; Point-to-point and Multidrop circuits; The telephone Network; Switched and non-switched options in communication; Connection oriented and connectionless networks

2. **Networking Medium**   **(15)**

   Network Cabling: (Tangible physical media); General Cable characteristics; Base band and Broadband Transmission; The importance of Bandwidth; Co-axial, Twisted-pair, Fiber-optic Cable, UTP; Wireless Networking: (Intangible Media); Types of wireless networks; Wireless LAN application; Wireless LAN Transmission; Wireless Extended LAN Technologies; Microwave Networking Technologies; High-speed wireless Networking Technologies

3. **Network Architecture**   **(15)**

   OSI and 802 Networking models; Role of Reference Model; OS1 Network Reference model; IEEE 802 Networking Specifications; Ethernet; Overview of Ethernet; 10/100 Mbps IEEE Standards; Gigabit Ethernet; Frame Types Ethernet; Segmentation ConceptToken Ring; Token Ring fundamentals; Hardware components; Structure of Token RingApple talk and ARCnet; FDDI; Boradband Technologies; Broadcast Technologies; ATM and SONET Concepts

3. **Networking devices**   **(15)**

   Network Interface Grids (NIC); Basics of NIC and operation; Principles of NIC Configuration; Special purpose NIC, Wireless adapters and Remote Boot adapters; Device Driver Software; Equipment Perspective; Repeater ,Bridge ,Router ,Gateways; Protocol Specific Devices; Router Technology , Multiplexer; Network Switches

Reference Books:-

1. Computer Networks by Uyless Black.
2. Computer Communication and Networking Technologies by Michael A Gallop
3. Networking Essential, BPB Publication
4. Introduction to Networking by Barry Nance, PHI publication.
5. Computer Networks Andrew S Tanenbaum
6. Data & Computer Communication William Stallings.

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CS -57: Data Analytics –I

Course Outcomes:
At the end of the course, a student shall be able to :
- implement statistical analysis techniques for solving practical problems
- perform statistical analysis on variety of data
- learn and implement the concepts of machine learning
- apply the techniques of Supervised Learning with Regression and Classification

Total credits: 04   **Total lectures: 60**

Course content
Prerequisite: This course requires that you are familiar with high-school level linear algebra, and calculus. Knowledge of probability theory, statistics, and programming is desirable.

1.Introduction: **(10)**
Data Definitions and Analysis Techniques: Elements, Variables, and Data Categorization, Levels of Measurement, Data Management and Indexing

2. Descriptive Statistics **(10)**
Introduction to the course Descriptive Statistics Probability Distributions, Measures of Central Tendency, Measures of Location of Dispersions, Error Estimation and Presentation (Standard Deviation, Variance), Introduction to Probability

3.Inferential Statistics **(10)**
Inferential Statistics through hypothesis tests Permutation & Randomization Test

4.Regression& ANOVA **(10)**
Regression ANOVA(Analysis of Variance)

5. Machine Learning: Introduction and Concepts **(10)**
Differentiating algorithmic and model based frameworks
Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression,
K Nearest Neighbours Regression & Classification

6. Supervised Learning with Regression and Classification techniques -I **(10)**
Bias-Variance Dichotomy
Model Validation Approaches
Logistic Regression
Linear Discriminant Analysis
Quadratic Discriminant Analysis

Reference Books:
1.Hastie, Trevor, et al.The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2.Montgomery, Douglas C., and George C. Runger.Applied statistics and probability for engineers. John Wiley & Sons, 2010

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CS – 58 : Research in Computer Science -I

Course Outcomes:

At the end of the course, a student shall be able to :
- To familiar with the basics of Concepts of research
- Gain knowledge of different terms used in research.
- Implement and know the methods of research and data collection methods.

Total credits: 04   **Total lectures: 60**

Course content

1. **Basic Concepts of Research**   **(14)**
   Definitions of research, nature and scope of research, characteristics of good research, types of research, qualities of good researcher, basic and applied research.

2. **Preparation for Research**   **(16)**
   Preparing bibliography for background reading, formulating the research problem, survey of relevant literature, developing hypothesis and defining aims and objectives, deciding the scope and limitations of research, adopting appropriate research methodology, writing a research proposal

3. **Methods of Research**   **(13)**
   Different methods of research, research methods and research methodology, experimental research, types of experiments

4. **Data Collection**   **(17)**
   Primary and secondary sources of data, Primary: Observation, Interview, Questionnaire, Secondary: Internal and External, Collecting and Classifying Data Editing and analyzing the Data, Arriving at Interpretations and Generalizations

References

1. Michael P. Marder, Research Methods for Science, Cambridge University Press, 20111.
2. Research Methodology and project work by Dr. P.M. Herekar ,PhadkePrakashan
3. Research Methodology: Methods and Techniques by New age International Publishers, Third edition.

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UG AECC-51: Soft Skills

Course Outcomes

At the end of this course, Students will be able to
- communicate with others effectively
- exhibit qualities of leadership
- take responsibility to undertake a work and complete it.
- work in groups either as members or leaders
- think critically or laterally and solve problems
- be flexible to the needs of others
- negotiate with others to solve problems (conflict resolution)
- cope with pressure and yet produce results

Total credits: 02   **Total lectures: 30**

Course content

1. **Introduction to Soft Skills:**   **(5)**
   Definition of soft skills; Need for soft skills; Nature and scope of soft skills; Acquiring soft skills; Advantages of soft skills

2. **Communication Skills:**   **(5)**
   Types of Communication; Forms (Modes) of communication; Spoken communication; Written communication; Non-verbal communication; Barriers to communication; Linguistic skills; Listening, speaking, reading and writing (LSRW); Body language

3. **Soft Skills**   **(5)**
   Critical, creative and positive thinking; Leadership, assertiveness and negotiation skills; Stress management and time management; Self-management; Building relationship skills; Problem-solving skills; Effective teamwork skills

4. **Personality Development**   **(5)**
   Meaning of personality; Role of biological and social factors in forming personality; Personality traits; Motivation, awareness, creativity, punctuality; Teaching personality development

5. **Values**   **(5)**
   Meaning of values; Importance of values; Kinds of values; Concept of mortality, character, duty and virtue; How to cultivate values

6. **Attitude**   **(5)**
   Positive attitude; Negative attitude; Neutral attitude; Other attitudes; Formation of attitude; Components of attitude: emotional, behavioural, cognitive; Functions of attitude

Prescribed Textbook:

Tengse, Ajay R. *Soft Skills: A textbook for Undergraduate*, Hyderabad: Orient Black Swan

Reference Books
1. Covey Sean, *Seven Habits of Highly Effective Teens*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, *How to win Friends and Influence People*, New York: Simon & Schuster, 1998.
3. Daniel Coleman, *Emotional Intelligence*, Bantam Book, 2006
4. Fredrick H. Wentz, *Soft skills Training – A workbook to develop skills for employment*
5. Barun K. Mitra*Personality Development and Soft skills*, Oxford University Press

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