S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS - 41   : Data Structures using C++

Course Outcomes:
At the end of this course, a student shall be able to:
- teach fundamental data structures, which allow one to store collections of data with fast updates and queries.
- efficiently implement the different data structures.
- efficiently implement solutions for specific complex problems.

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

Course content
Prerequisites: Students are expected to be proficient in a high-level object oriented programming language like C++

1. Introduction to data structures   **(6)**
   Abstract Data type, data object, data structures, algorithm analysis, space and time complexity

2. Sorting and searching techniques   **(10)**
   Bubble, Selection, Insertion, Shell sorts and Sequential, Binary, Indexed Sequential Searches, Binary Search Tree Sort, Heap sort, Radix sort

3. Stack and queue   **(12)**
   Stacks: LIFO structure, create, POP, PUSH, multiple stacks, hashing, applications
   Queues: FIFO structure, Priority Queues, Circular Queues, operations on Queues

4. Linked lists   **(12)**
   Concept,   Node structure ,Types of linked list, Linked List Data Structure and operations like Create List, Insert Node (empty list, beginning, Middle, end), Delete node(First, general case),   Search list, Retrieve Node, add node, Remove node, Print List , Circularly-Linked List , Doubly Linked List(Insertion, Deletion)

5. Trees   **(10)**
   Tree terminologies, binary tree concept, types of binary trees, operations performed on it , binary Search tree ,Expression trees, AVL trees ,threaded binary tree, Tree traversals, applications.

6. Graphs   **(10)**
   Definition, types of graph , terminologies , representation in memory, graph data structures, Operations on graph, Breadth first search, Depth first search , Shortest path problem, spanning tree concept ,topological sort.

References:-
1. Data Structures and Algorithm Analysis in C++, Michael T. Goodrich, Wiley student edition, 2007.
2. Data Structures Using C++, Sahni ,The McGraw-Hill, 2006.
3. Schaum's Outlines Data structure, Seymour Lipschutz, Tata McGraw Hill 2nd Edition
4. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, 2nd Edition, Pearson Education , 1997
5. Data Structures Using C and C++ by Tanenbaum amd Moshe, 1998
                                          ******

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS-42 : ASP.Net

Course Outcomes:

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

- create a Web form with server controls.
- Separate page code from content by using code-behind pages, page controls, and components.
- Display dynamic data from a data source by using Microsoft ADO.NET and data binding.
- Debug ASP.NET pages by using trace.

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

Course content
 1) **Introduction to ASP.NET**   **(8)**
    Asp.net Component Model, ASP.NET Development Stack, Difference between C# and ASP.NET
 2) **Introduction to ADO.NET**   **(10)**
    .Net Data Access Infrastructure, Connected Architecture using ADO.Net, Data reader, Connection objects, command Objects.
3) **Disconnected architecture using ADO.Net**   **(10)**
    Data adapters, and Datasets, Data binding with controls, Navigating data source ,Data from wizard
4) **Crystal Report**   **(10)**
    Connection to Database, Building Reports, Modifying Report, Header, Footer, Details, Group Header, Group Footer, Summary ,Working with Multiple tables
5) **Web application:**   **(8)**
    Introduction to Web form, page directive, Page redirection
6) **Web services:**   **(8)**
    Concept of web services, Create a small web services
7) **Deployment:**   **(6)**
    Deploying applications using wizard

TEXTBOOKS:
1.   E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004. (Unit I, II)
2.   J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2002. (Unit III, IV, V)

REFERENCE BOOKS :
1.   Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
2.   Robinson et al, "Professional C#", 4th ed., Wrox Press, 2002.
3.   Andrew Troelsen, "C# and the .NET Platform", A! Press, 2003.
4.   Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.
 5. Programming Microsoft ASP.NET Dino Esposito

*****

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS-43 : Computational Geometry

Course Outcomes

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

- understand how to represent point, lines, transformation and matrices, various types of transformation.
- solve multiple transformation and projection on three dimensional.
- find equidistance points on ellipse, circle, parabola, hyperbola.
- understand the concepts Beizer curve , its properties and B-spline curve.

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

Course content

[1] Two Dimensional Transformations

[19]

  (1.1) Introduction   (1.2) Representation of points

  (1.3)Transformation and matrices   (1.4) Transformation of points

  (1.5) Transformation of straight line   (1.6) Midpoint transformation

  (1.7) Transformation of parallel lines   (1.8) Transformation of intersecting lines

  (1.9) Transformations: rotation, reflection, scaling, shearing

  (1.10) Concatenated transformations   (1.11) Transformation of a unit square

  (1.12) Solid body transformations (1.13) Translations and homogeneous coordinates

  (1.14) Rotation about an arbitrary point   (1.15) Reflection through an arbitrary line

  (1.16) Overall scaling , point at infinity

  (1.17) Projection – a geometric interpretation of homogeneous cordinates

[2] Three Dimentional Transformations   **[19]**

  (2.1) Introduction

  (2.2) Three Dimentional-Scaling, Shearing , Reflection, Translation,Rotation

  (2.3) Multiple Transformation

  (2.4) Rotation About - an axis parallel to a coordinate axis, an arbitrary axis in space

  (2.5) Reflection through an arbitrary plane.   (2.6) Affine and Perspective Geometry.

  (2.7) Orthographic Projections.   (2.8) Axonometric Projections.

  (2.9) Oblique Projections   (2.10) Single Point Perspective Transformations.

  (2.11) Vanishing Points

[3] Plane Curves   **[19]**

  (3.1) Introduction   (3.2) Curve representation

  (3.3) Non-parametric curves.   (3.4) Parametric curves.

  (3.5) Parametric representation of circle.   (3.6) Parametric representation of ellipse.

  (3.7) Parametric representation of parabola.   (3.8) Parametric representation of hyperbola

[4] Space Curves   **[03]**

  (4.1) Beizer Curves –Introduction , Definition, Properties (without proof), Curve   Fitting

       (Upto n=3), Equation of Curves in Matrix form (upto n=3)

  (4.2) B-Spline Curve-Introduction ,Definition, Properties (without proof)

TEXT BOOKS:

1. S.Y.B.Sc. (Computer Science) Sem.-I, Paper-I Linear Algebra, Nirali Prakashan
2. S.Y.B.Sc. (Computer Science) Sem.-I, Paper-I Linear Algebra, Vision Publication

3. S.Y.B.Sc. (Computer Science) Sem.-II, Paper-I, Computational Geometry, Nirali Prakashan
4. S.Y.B.Sc. (Computer Science) Sem.-II, Paper-I, Computational Geometry, Vision Publication
5. F.Y.B.Sc.. (Computer Science) Geometry and Calculus, Nirali Prakashan
6. F.Y.B.Sc.. (Computer Science) Geometry and Calculus, Vision Publication
7. D. F. Rogers, J. A. Adams, Mathematical elements for Computer graphics, Mc Graw Hill Intnl Edition.

REFRENCE BOOKS:

(1) G.S. Pandey And R.R.Sharma; Vector and Geometry ; Wishwa Prakashan
(2) P. Balsubrahamanyam, K.G. Balsubrahamanyam, G.R.Venkataraman; Coordinate Geometry of two and three Dimensions; Tata mcgraw-HILL, New Delhi
(3) David F. Rogers, J Alan Adams; Mathematical Elements for Computer Graphics (Second Edition); mcgraw-HILL International Editions.1990
(4) William M. Newman, Robert F. Sproul; Principles of Interactive computer Graphics (Second Edition); International Student Edition, Mcgraw-Hill Book company, Tokyo. 1979.

*****

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS-44 : Optimization Techniques

Course Outcomes

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

- understand formulation of L.P.P., graphical method and simplex method, duality of L.P.P.
- find the initial basic feasible solution and optimal solution by using North-West corner method, Least cost method, VAM method, MODI method of transportation problem.
- find initial optimal solution by using Hungarian method with their types.
- understand the concept of game, ability to solve game by using graphical method and dominance method

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

Course content

　[1] Linear Programming :-　　　　　　　　　　　　　　　　　　　　**[15]**
　　　(1.1) Advantages, Limitations, Definitions, Terminology, Formulation of L.P.P.
　　　(1.2) Solution by Graphical Method & Simplex Method, special Cases
　　　(1.3) Duality – concept, Interrelation between a Primal and Dual, Advantages,
　　　　　　Interpretation of dual
　　　(1.4) Solution of L. P. P. by simplex method (verification by TORA)

　[2] Transportation Problems :-　　　　　　　　　　　　　　　　　　**[18]**
　　　(2.1) Introduction, General structure of transportation problem
　　　(2.2) Unbalanced transportation problem
　　　(2.3) North-West Corner Method, Least Cost Method, Vogel's Approximation Method
　　　(2.4) MODI Method
　　　(2.5) Degeneracy in transportation problem
　　　(2.6) Maximization in transportation problem
　　　(2.7) Prohibited transportation problem
　　　(2.8) Numerical problems
　　　(2.9) Transportation problem (verification by TORA)

　[3] Assignment Problems :-　　　　　　　　　　　　　　　　　　　　**[17]**
　　　(3.1) Statement and mathematical representation of assignment problem
　　　(3.2) Unbalanced assignment problem
　　　(3.3) Hungarian method of solving A.P. (Minimization Case)
　　　(3.4) Maximization assignment problem
　　　(3.5) Multiple assignment problem
　　　(3.6) Prohibited assignment problem
　　　(3.7) Numerical problems
　　　(3.8) Assignment problem (verification by TORA)

　[4] Theory of games　　　　　　　　　　　　　　　　　　　　　　**[10]**
　　　(4.1) Two persons zero sum game, pure and mixed strategies, statement of
　　　　　　The mini-max theorem
　　　(4.2) Graphical method for solving 2xm principles and dominance and
　　　　　　 Nx2 games and solving some simple games
　　　(4.3) Connection between the game problem and L. P. P., Simple games

TEXT BOOK:

Prof S.R.Patil; Prof S.G.Gujrathi; Prof D.M. Pandhare;
Numerical Methods And Operation Research; Nirali Prakashan,1998.

REFRENCE BOOKS:

1. R.J. Dromey; How To Solve It By Computer; Prentice-Hall Of India; 1982
2. V.K.Kapoor; Operations Research; Sultan Chand & Sons Educational Publishers, New Delhi; 1985.
3. S.D.Sharma; Operations Research;Kedar Nath Ram Nath & Co. Publishers, Meerut, 1972.
4. L.C. Jhambh; Quantitative Techniques Vol I & II; Everest Publishing House, Pune-1998.
5. N.D. Vohra; Quantitative Techniques in Management (Second Edition); Tata mcgraw-Hill Publishing Company Limited New Delhi; 1990.
6. Kanti Swarup, P.K.Gupta, Man Mohan; Operations Research; Sultan Chand & Sons Educational Publishers, New Delhi, 1977.
7. P.K.Gupta, D.S.Hira; Operations Research ; S.Chand & Company Ltd, New Delhi. 1979.
8. N.Paul Loomba; Linear Programming TMH Edition; Tata mcgraw-Hill Publishing Company Limited, New Delhi, 1971.

*****

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS- 45 : 8051 Microcontroller

Course Outcomes:

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

- understand the basics of 8051 microcontroller
- explore the Programming and interfacing techniques of 8051
- apply knowledge of 8051 to design different application circuits
- acquainted with the basic concepts of advanced Microcontrollers

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

Course content

1. **Introduction to 8051 microprocessor**   **[16]**
   Introduction to microcontrollers, difference between a microcontroller and microprocessor. Architecture of 8051:Block Diagram of 8051 and Study of Internal Blocks, Pin configuration of 8051,Reset and Clock, Registers, Flags and Internal Memory, SFRS, I/O Ports. Input/Output, Ports, internal memory, External memory.

2. **8051 Instruction Set**   **[14]**
   Study of 8051 Instruction Set and Addressing Modes: Immediate, register, direct, indirect and relative, assembler directives .Data transfer, Arithmetic, Logical, JUMP, Loops & CALL instructions, Bit manipulation Instructions.

3. **Facilities in 8051**   **[18]**
   Programming 8051 timers, counter programming timer interrupts,
   Timer and Counter: Timer and Counters, Timer modes, Programming for time delay in Mode 1 and Mode 2 using assembly and C. Introduction to interrupt ,Interrupt types and their vector addresses. Interrupt enable register and interrupt priority register(IE,IP), Synchronous and asynchronous serial communication , Programming serial port without interrupt, Use of timer to select baud rate for serial communication.

4. **Interfacing:**   **[12]**
   Interfacing ADC, DAC, LCD, stepper motor.

Recommended Books:

1. "The 8051 Microcontroller and Embedded systems using Assembly and C", by Rolin D.MckinlaySecond Edition. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. by Mckinlay.
2. "The 8051 Microcontroller Architecture, Programming & Application", K.Uma Rao and AndhePallavi, Pearson publications.
3. Programming and customizing the 8051 microcontroller by Myke Predko.
4. ARM System Developers guide: Sloss, Andrew n. Symes.
5. Design with PIC microcontrollers: Peatman, Pearson publications.

*****

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS-46 : Analog Systems

Course Outcomes:

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

- understand basics of analog electronics
- experiment with different types of sensors
- work with different types of signal conditioning circuits
- apply knowledge of analog systems in different applications including ECG

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

Course content

1.   Measurments, Instrumentation And Calibration   [6]
        Measurements, Units, Standards Instrument, instrumentation, Calibration

2.   Trancducers And Sensor   [20]
        Definition of sensors and transducers. Classification of sensors: Active and passive
        sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution,
        reproducibility. Temperature sensors (LM-35 and AD590), pH sensor, piezoelectric
        humidity sensor, optical sensor (LDR), displacement sensor (LVDT), Passive Infrared
        sensor (PIR), tilt sensor, touch sensor, ultrasonic sensor

3.   Signal Conditioning   [20]
        Principles of signal conditioning, Signal conditioning of passive sensors using bridge
        circuit:Wheatstone 's bridge, Level Shifter, Amplifier, Three OP-amp instrumentation
        amplifier, Filters;active and passive filters. Working principle of Single order Op-
        Ampbased Low Pass Filter, High Pass Filter, Band Pass Filter, Notch Filter, Band reject
        filter;Working of Voltage to frequency Converter using OpAmp.

4.   Case Study   [14]
        Temperature monitoring system using LM35, Water Level Indicator system using float
        switch, Electrocardiography (ECG).

Books Recommended

1. Electronic Instrumentation: H. S. Kalsi: TMH: 2nd Ed.
2. Modern Electronic Instrumentation and Measurement Techniques: Albert D.
3. Helfrick, William D. Cooper: PHI publications
4. Electronic measurements : K.A. Bakshi, A. V. Bakshi and U. A. Bakshi, Technical
   publications. A Course in Electrical and Electronic measurements and Instrumentation:
   A.K. Sawhney:
5. Dhanpat Rai & Sons Educational & technical publishers
6. Transducers & Instrumentation -   Murthy PHI (Unit 1)
7. Instrumentation Measurements & Analysis- Nakra & Chaudhry TMH
8. Instrumentation Devices & Systems - Rangan, Sarma, Mani TMH
9. Sensors & Transducers : Dr. A. D. Shaligram: CTC publications
10. Op-Amps and Linear Integrated Circuits: Ramakant Gaikwad: PHI: 4th Ed.

<center>*****</center>

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS PVII: Computer Science Practical - VII

Course outcomes:

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

- explores stacks, queues, lists, vectors, hash tables, graphs, trees and algorithms including sorting, searching, iterating over data structures and recursion.
- design and construct simple object-oriented software with an appreciation for data abstraction and information hiding.
- effectively use software development tools including libraries to write and troubleshoot programs.

Total Credits 2

Course Content

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 .

   40 marks: Practical work 30 marks and 10 marks for oral

PROGRAM LIST IN DATA STRUCTURES

1. Write a program in C++ to implement sorting algorithms like simple exchange sort, insertion sort and   selection sort
2. Write a program in C++ to implement searching techniques like linear search and binary search.
3. Write a program in C++ to implement simple linear Stack with its basic operations like push(),POP()
4. Write a program in C++ to implement simple linear Queue and its operations.
5. Write a menu driven program that implements singly linked list for the following operations: Create, Display, add a new node, delete a node
6. Write a menu driven program that implements doubly linked list for the following operations: Create, Display, insert and delete
7. Write a program in C++ to implement insertion and deletion in B tree.
8. Write a menu driven program in C++ to
   a. Create a binary search tree
   b. Traverse the tree in Inorder, Preorder and Post Order
9. Write a program in C++ to implement binary search tree.
10. Write a program in C++ to implement simple linear Queue and its operations using linked list.
11. Write a program in C++ to implement stack and its operations using linked list.

*****

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS PVIII: Computer Science Practical - VIII

Learning Outcomes:

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

- understand the difference between desktop and dynamic web applications.
- understand the ASP.NET web application execution model.
- create and modify multi-page Web Form applications that involve and demonstrate features such as flow control, the use of style sheets, state management, data access, data binding, security, and data verification and validation.
- understand web application configuration and demonstrate the ability to manage basic configuration issues.

Total Credits 2

Course Content

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 .

  40 marks: Practical work 30 marks and 10 marks for oral

1. Write program to create ado.net connectivity using connected architecture. (using Connection, Data reader , command object) & display data in List box.
2. Write program to create ado.net connectivity using disconnected architecture.(using Connection ,Data Adapter ,Data dataset object) & display data in textboxes & navigate data. (first ,prev, next, last)
   Write ASP.NET program using ado.net for multiple table connection through wizard (textbox, list box)
3. Create crystal report .
4. Write ASP.NET program for exception handling. (Try-Catch)
5. Create WebApplication using Validation Controls
6. Create small WebServices
7. Create application using deployment.
8. Write program using ado.net to connect data grid .

*****

CS EIV: Electronics Practical -IV

Course Outcomes:

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

- use basic concepts for building various applications in electronics.
- design procedures of different electronic circuits as per requirement.
- build experimental setup and test the circuits.
- explore the analyzing skills through the results of given experiments.

Total Credits 2

Course content

➢ Examination will be conducted on 8 experiments.

Practical Examination

A) Internal Marks 40 : Completion of journal , attendance and involvement in activities.

B)Semester examination: 60 Marks in One session of 3 Hrs .

   60 marks Distribution: Practical work 50 marks and 10 marks for oral

Distribution of 50 marks

Circuit diagram / flowchart and algorithm	15
Connection / program	10
Demonstration and working explanation	10
Observation table	10
Result analysis / conclusion	05

(Note : Any 8 experiments should be performed)

1. Absolute decoding and linear select decoding.
2. Temperature to frequency / voltage converter
3. Reed relay control using digital logic
4. Build and test Amplitude Modulator and Demodulator.
5. Build and test Frequency Shift Keying.
6. Build and test TDM.
7. Study of pulse amplitude modulation.
8. Demonstration of working of Wi-fi card.
9. Demonstration Experiment on RFID application.
10. Build and test LDR based light control system.
11. Study of Linear Variable Differential Transformer.
12. Build and test Instrumentation Amplifier.
13. Study of radiation pattern of antenna.
14. 8051 Microcontroller programs: Arithmetic, logical & code conversion problems using assembly/C programming
15. Interfacing the thumbwheel & seven segment display.
16. Traffic light controller using microcontroller.
17. Interfacing LCD to Microcontroller.
18. To study waveform generator (square, triangular and saw tooth using DAC) with microcontroller
19. Study of radiation pattern of antenna.

*****

CS-47 : Cloud Computing -II

Course Outcomes:

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

- explore the concept of virtulization in cloud computing
- understand and explore the security in cloud computing
- understand how to manage storage in cloud
- study the applications that uses cloud computing

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

Course content

1. **Virtualization :**   **(10)**
   Introduction, Characteristics of Virutalized environments, Taxonomy of Virtualization techniques, Pros and Cons of Virtualization.

2. **Storage in Cloud:**   **(12)**
   Storage system architecture, Big data, Virtualize data centre(VDC) architecture,VDC Environment, storage, networking.

3. **Security in Cloud Computing :**   **(12)**
   Introduction, Global Risk and Compliance aspects in cloud environments and key security terminologies,   Technologies for Data security, Data security risk.

4. **Applications:**   **(10)**
   Business applications, management applications, social applications, entertainment applications

5. **Cloud computing platforms:**   **(6)**
    cloud platforms and challenges.

6. **Advance concepts in cloud computing:**   **(10)**
    Basics and Vision, Applications and Requirements, Smart Devices and Services, Human Computer Interaction

Reference Books:

1. Cloud Computing: A Practical Approach for Learning and Implementation - Srinivasan
2. Cloud Computing : Rajiv Chopra, New Age International Publications
3. Cloud Computing Implementation, Mangement and Security: John W .Rittinghousa, CRC Press
4. Handbook on Cloud Computing, BorivojeFurht, Armando Escalante, Springer, 2010

*****

S.Y.B.Sc. (Computer Science) (CBCS 2018 Course) Semester – IV

CS-48 : Data Warehousing and Data Mining- II

Course Outcomes:

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

- study and understand various algorithms used for data mining
- analyze the data using existing data mining tools
- apply operations like association , classification and clustering for a given dataset
- understand and implement clustering and and partitioning methods

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

Course content

1.Data preprocessing   **(12)**

Need, Objectives and techniques , Data cleaning ,integration ,transformation, reduction, discretization

2.Data mining concepts   **(12)**

Data mining architecture , evolution of database technology , Types of data that can be mined ,functionalities, classification, major issues

3.Association rule mining   **(12)**

Basic concepts, market basket analysis, road map, classification of association rule

4.Classification and prediction   **(12)**

Classification concept , prediction, issues regarding classification and prediction, comparing classification methods, decision trees ,attribute selection measures

5.Cluster Analysis   **(12)**

Introduction ,need ,clustering methods, types of data in cluster analysis ,partitioning methods, Cases, Case studies

Reference Books:

1. Data mining concepts and techniques - Jiawei Han and Micheline Kamber
2. Data Mining Data Warehousing- Nilesh magar, Vision Publication
3. Data Mining Techniques- Dr. Arun K. Pujari, Universal Press
4. Principles of Data Mining – Bramer, Springer