

**Kadi Sarva Vishwavidyalaya, Gandhinagar**  
**BCA Semester IV**  
**BCA 401: Intellectual Property Rights**

**Teaching & Evaluating Scheme:** Teaching Scheme would consist of classroom board based teaching as well as Group activity, Role play and Problem solving of relevant real time data.

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quizzes, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85% ), Internal marks which consist of 15 (7.5 Term Work + 7.5 Sessional Exams) marks and External marks which consist of 35 for University examination.

| Sub Code | Subject Title                | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|------------------------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                              | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 401  | Intellectual Property Rights | 2               | 2        | Internal    | External | Internal  | External |             |
|          |                              |                 |          | 15          | 35       | --        | --       |             |

**UNIT- 1: Introduction to Intellectual Property**

[25%]

- Concept & Meaning of Intellectual Property
- Nature and Characteristics of Intellectual Property
- Different types of IPR (Copyright, Patent, Trade Marks, Designs, Geographic indication, Semiconductors, Plant varieties, Trade Secrete)

**: Brief about Patent, Copy Write, Trademarks Overview**

- Registration process,
- Validity and Rights
- IPO website

**UNIT -2: Important terminologies**

[25%]

- True inventor and Assignee
- Concepts of Novelty, Non obviousness, Industrial application, Utility, Non patentable matters,

- Priority dates and date of filling, Provisional and complete specification
- Prior Art, Anticipation, & Person Skilled in the Art
- The patent act ,WIPO, IPAB, International treaties, PCT route
- Pre-Grant and Post Grant Opposition,Grant and sealing of Patents
- Rights of Patentee and Term of Patent,Surrender, Revocation and Restorationof patents

**UNIT-3: Procedure for Obtaining of Patents** **[25%]**

- Application, Publication, Opposition, Examination, Grant, Forms and fees, Components of patent specification, Claims

**Infringement:**Brief, Types Infringement and its determination, exemption in infringement

**UNIT-4: IPR and Information Technology** **[25%]**

- Internet and the Protection of Software Copyright: Open Source, Reverse Engineering
- Trademark Issues in Cyber Space: Domain Name, The ICANN Uniform Domain Name Dispute Resolution Policy
- Cyber Crimes and Intellectual Property Rights: Introduction, Essential Ingredients of Crime, Types of Internet Crimes
- Case studies

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## BCA Semester IV

### BCA402: Project Documentation

**Rationale:** Documentation plays a key role in any stream of study especially when project development is concerned. In any company and literature, standard documentation is mandatory. If we focus on IT, Project development is an essential part of curriculum so it is indispensable to focus on how to develop cognitive skill in ideal project documentation.

#### Learning Outcomes:

- Stimulate interest in learning Documentation
- Understand the purpose and importance of Documentation.
- Increase the awareness of various components of Project Documentation
- To make clear about various types and structure of IT Project
- Make them focus on Project Life Cycle or framework within different stages during Documentation
- To ensure the practical aspects in corporate culture with respect to Project Documentation.

#### Teaching and Evaluation Scheme:

| Sub. Code | Subject Title         | Teaching Scheme |             | Exam Scheme |          |           |          | Total Marks |
|-----------|-----------------------|-----------------|-------------|-------------|----------|-----------|----------|-------------|
|           |                       | Cr.             | Hrs. / Week | Theory      |          | Practical |          |             |
|           |                       |                 |             | Internal    | External | Internal  | External |             |
| BCA 402   | Project Documentation | 2               | 2           | 15          | 35       | -         | -        | 50          |

#### UNIT 1 : BASICS OF DOCUMENTATION : [50%]

Meaning – Importance – Characteristics of Documentation , Types of Documentation , - Purpose and Challenges of Documentation , - Project Plan , - Steps for writing Project Plan , - Various components of Project Documentation (Title Page, Acknowledgement , Certificate , Abstract , Index , Objective , Citation , Bibliography , Appendices)

#### UNIT 2 : BASICS OF IT PROJECTS [50%]

Definition of IT project – Project Life Cycle —Project Types – Project Technology – Scope of Technology – Project Category (in-house / Internship / External ) – Project structure (Individual / Group)- Project Index formation – Case Study of Project Documentation.

**Reference Book :**

- 1) The Practical Guide to the Project Management By : John Rakos , Publish by Wiley
- 2) Project Management Handbook , Publish by Novartis Foundation

**Web Reference :**

- <https://study.com/academy/lesson/what-is-it-project-management-definition-tools-examples.html>

**Question Paper Scheme:**

University Examination

Duration: 1.5 Hours.

Total marks: 35

Q.1-Unit-I & II (11 Marks) Objective / Short Questions

Q.2-Unit-I (12 Marks) Descriptive / Long questions

Q.3-Unit-II (12 Marks) Descriptive / Long questions

**Note: Q.2 and Q.3 must have at least 40% Internal Options (i.e. Attempt Any 3 out of 5)**

**X ----- X**

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## BCA Semester IV

### BCA 403: Application Development using VB.NET

#### Rationale:

VB.Net is the front end tool which is used for programming in applications like Microsoft studio. VB.Net is used in creating Applications -desktop applications; Windows based layout and designing. The windows components are used to develop an application Visual Studio is the front end tool which is used for front end back end technology through ADO.NET. we can build Client – Server application using stand alone as well as conceptual network. This is the need of software industries for utility / company related application software.

#### Learning Outcomes

- To understand the difference between Procedural & Object Oriented Technology.
- To recognize the events, methods and properties.
- To identify GUI based tools and other advance tools.
- To implement concept of Front-End and Back-End.
- To understand the Client and Server application concept.

#### Resource Required

- Computer Lab Facility with Microsoft Visual Studio
- Projector

#### Teaching and Evaluation Scheme:

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quiz, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85% ), Internal marks which consist of 30 (Term Work + Sessional Exams) marks and External marks which consist of 70 for University examination.

| Sub Code | Subject Title                        | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|--------------------------------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                                      | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 403  | Application Development using VB.NET | 4               | 4        | Internal    | External | Internal  | External |             |
|          |                                      |                 |          | 30          | 70       | -         | -        |             |

#### Unit-I

[25%]

#### Introduction to Framework Technology & IDE

**Applications:** Overview of .net framework technology that enhance with IDE components and basic elements of programming concepts.

- Introduction – VB.NET Framework & Architecture
- Components – CLR, CTS, CLS
- Variable, Constant & Objects – Declaration
- Operators – Arithmetic, Assignment, Logical, Relational, Increment/Decrement etc.

**Text Book 2:** Page No. 1 – 24.

## **Unit-II**

[25%]

### **Basics of VB.NET**

**Applications:** Basic windows control that developer use most often in general application development as front-end designing.

- Control Statements ( Decision Making, Looping, Branching )
- Module
- Introduction about Properties, Methods, Events
- Basic Tools (Textbox, Button, Label, Richtextbox, Listbox, Combobox, Timer, PictureBox, Radiobutton, Checkbox, Datetimepicker, Trackbar, Scrollbar, Panel, Groupbox)

**Text Book 1:** Page No. 241 - 287

**Text Book 2:** Page No. 26 – 75,

## **Unit-III**

[25%]

### **Interactive Tools – MDI – File Process**

**Applications:** Briefing idea about handling multiple forms as a project development and multiple document management with parents and child concepts of interface. Retrieving data with string class using file concept.

- Intermediate multiple data items tools – Listview, Treeview
- Dialogbox – Openfile, Savefile, Print, Color, Font )
- Library Functions – String, Numeric, Datetime
- MDI – Menustrip, Context Menu
- Concept of Front-End & Back-End, File Handling ( StreamReader & StreamWriter )

**Text Book 1:** Page No. 837 - 865

**Text Book 2:** Page No. 78 – 139

## **Unit-IV**

[25%]

### **Client Server Methodology**

**Applications:** Purely Client Server Architecture of .NET technology using ADO.NET that retrieving data from database as data manipulation by SQL database technology. With the help of data mining technique create charts and reports.

- ADO.NET Architecture
- 3 Tire Architecture
- ADO.NET Components – Dataset & Dataprovider ( Connection, Reader, Adaptor, Command)
- Data Manipulation – Insert , Update, Delete, Select
- Datagridview and other data components
- Reports and Charts

**Text Book 1:** Page No. 925 - 995

**Text Book 2:** Page No. 151 - 176

## **Text Book**

1. Mastering in Visual Basic .NET by Evangelos Petroutsos – BPB publication
2. Programming in VB.NET for Beginners by Keyur Shah & Parimal Patel – Books India Publication

## Reference Book

1. Programming by VB.NET by Dr. Shyam Chavda – Books India Publication.
2. An Introduction to programming using Visual Basic .NET by David I. Schneider – PHI Publications.

## Question Paper Scheme:

University Examination                      Duration: 3 Hours.                      Total Marks : 70

|                   |   |            |
|-------------------|---|------------|
| Q.1-Unit-I & II   | Objective / Short Questions                       | (11 Marks) |
| Q.2-Unit-I        | Descriptive / Long questions                      | (12 Marks) |
| Q.3-Unit-II       | Descriptive / Long questions / Practical Paradigm | (12 Marks) |
| Q.4-Unit-III & IV | Objective / Short Questions                       | (11 Marks) |
| Q.2-Unit-III      | Descriptive / Long questions                      | (12 Marks) |
| Q.3-Unit-IV       | Descriptive / Long questions / Practical Paradigm | (12 Marks) |

Note: Que.2, Que.3, Que. 5 and Que.6 must have at least 40% Internal Options (i.e. Attempt Any 3 out of 5)

## Question Bank

### Unit 1: Introduction to Framework Technology and IDE

1. Explain in Detail
  - a. .NET Frame work
  - b. IDE component of VB.NET
  - c. VB.NET operators with example
2. Short note
  - a. Write short note on CLR
  - b. Short note on VB.NET data types
3. Small Questions
  - a. All Abbreviations
  - b. Usability of CTS – CLS and CLR
  - c. How to declare variable in VB.NET

### Unit 2: Basics of VB.NET

1. Explain in Detail
  - a. Explain any 3 data entry level tools of VB.NET with suitable example
  - b. Explain Decision making statement with suitable example
  - c. Explain Looping statement with suitable example
  - d. Explain Branching statement with suitable example
2. Short note
  - a. Short note on : properties / events in VB.NET
  - b. Short note on : Timer tool
  - c. All basic tools individually ask as short note
3. Give comparison / Differentiate
  - a. Textbox v/s Rich textbox
  - b. Radiobutton v/s Checkbox
  - c. Combobox v/s Listbox
  - d. Scroll bar v/s track bar

4. Small Questions
  - a. Properties of all mentioned tools
  - b. Application / usability of module in VB.NET

### **Unit 3 : Interactive Tools – MDI – File Process**

1. Explain in Detail
  - a. Explain File handling with its major class with example
  - b. Explain menu control with suitable example
  - c. Explain Any 2 dialogbox control with suitable example
  - d. Explain any 3 library function of String / Numeric / Date-time
  - e. Explain Treeview / Listview with suitable example

#### Compare / Differentiate

- f. Menu v/s Context menu
  - g. Open file dialog v/s Save file dialog
  - h. List view v/s Tree view
  - i. Front End v/s Back End
  - j. Stream writer v/s Stream Reader
2. Small Questions
    - a. Properties of all mentioned tools
    - b. Example about Declaring Stream writer / Stream reader ..... etc of file class or methods

### **Unit 4 : Client Server Methodology**

1. Explain in Detail
  - a. Explain ADO.NET architecture with all classes
  - b. 3 Tier architecture of .NET technology
  - c. Explain how to create Report / Chart in VB.NET
2. Short note
  - a. Short note on : connections / command / data adaptor / dataset / data reader / data table
  - b. Short note on : datagrid view
3. Give comparison / Differentiate
  - a. Connection class v/s Command class of ADO.NET
  - b. Command class v/s Data reader class of ADO.NET
  - c. Data adapter v/s Data set class of ADO.NET
  - d. Scroll bar v/s track bar
4. Small Questions
  - a. Main methods of Connection / Command / Data adaptor / Data set / Data Reader / Data Table
  - b. Search Question syntax for searching records from database to VB.NET form

Note: This Question bank is just for reference for the students as well as paper setter; For the exam the questions may be different and may be in different forms.

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## BCA Semester IV

### BCA 404:Data Structure

**Rationale:** To understand the concepts of Primitive and Non-Primitive Data Structures, Linked List, Stack, Queue, Sorting-Searching using C and applications of Data Structure in System Development.

**Prerequisite:** Basic concepts of C programming language like Array, User defined functions, Structure, Dynamic Memory Allocation, Pointer

**Learning Outcomes:**

Student will be able to understand

- The concepts of Data Structure.
- Use of various concepts of Data Structures to develop efficient programs and managing different types of real and abstract data types.
- Use of Data Structure in Operating systems as well as other relevant application area.

**Teaching and Evaluation Scheme:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quizzes, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85%) and Internal marks.

| Sub Code | Subject Title  | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|----------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 404  | Data Structure | 4               | 4        | Internal    | External | Internal  | External |             |
|          |                |                 |          | 30          | 70       | --        | --       |             |

**Course content:**

**Unit 1: Introduction of data structure, Array Overview, Stack** **[25%]**

**Application:** To understand the concept of DS, storage representation and various application of Array and Stack

**Introduction of Data Structure:** The concept of data structure, Why we study data Structure? Primitive data structure, Non Primitive data structure, Operations on data structure, Abstract data type, **Array:** Array terminologies, addressing system of an array, Advantages and Disadvantages of an array, its applications. **Stack:** Introduction to Stack, Stack as an ADT, Operations on Stack: PUSH, POP, PEEP and CHANGE, Recursion, Infix, Prefix, Postfix notations. Evaluation of Infix to Postfix expression, Application of Stack

## Unit 2: Queue and Linked List (Singly Linked List)

[25%]

**Application:** To understand the concept, storage representation and various applications of Queue and SLL

**Queue:** Introduction of Queue as an ADT, Operation on Queue, Types of Queue (Simple, Circular, Double Ended Queue, Priority Queue), CPU scheduling in multiprogramming environment, round-robin algorithm.

Introduction of Linked list, Singly Linked List, Singly Circularly Linked List, Advantages and Disadvantages of Linked lists. Advantages and Disadvantages of One data structure over other.

**Page No: 146 to 179, 34 to 51**

## Unit 3: Linked Lists (Doubly Linked List) Sorting, Searching

[25%]

**Application:** To understand the concept, storage representation and various applications of Double Linked List, understand different methods of Sorting and Searching

Doubly Linked List, Doubly Circularly Linked List, Applications of Linked List: File Allocation Table (FAT), Process Control Block (PCB), Interrupt Request Assignment (IRA).

**Sorting:** Insertion Sort, Selection Sort, Bubble Sort, Quick Sort.

**Searching:** Linear Search, Binary Search

**Page No: 51 to 68**

## Unit 4: Conceptual View of Tree, Graph

[25%]

**Application:** To understand the concept, storage representation and various applications of Tree and Graph

**Tree:** Tree terminologies, Binary Tree, Binary Search Tree, AVL Tree, Tree Traversal, Application of Trees: Directory Structure.

**Graph:** Introduction to Graphs, Types of Graph, Representation of Graphs, Graph Traversals: DFS and BFS, Template of a Graph using one Application, Applications of Graph.

**Page No: 203 to 254, 356 to 415**

### Book:

- Classical Data Structure – D. Samanta – PHI Publication
- Data Structures: Theory and Problems – K.K.Patel and Kaushar Ghanchi Linux as easy as A B C - By RedHat

### Reference

- Data Structure - Tanenbaum
- Data Structures through C – Yashavant Kanetkar
- An Introduction to Data Structures with Applications – Jean Paul Tremblay and Paul G. Sorenson
- Linux Complete Reference by Vijay Shekhar

## Question Bank

### Unit: 1 Introduction of data structure, Array Overview, Stack

1. Define Following terms:  
Data, Data Structure, Information, Data type, Abstract Data type, Array, Base Address, Range, Size, Lower bound, Upper bound, Stack, Top
2. Draw the classification of Data Structure.
3. Which are the operations of Data Structure?
4. Write an algorithm of PUSH and POP algorithm of Stack.
5. Explain the applications of stack.
6. Convert Infix expression to Postfix expression:
  - a.  $A + B / C * D + E / F + G / H$
  - b.  $P * Q * (R + S / T + U) / V + W$
  - c.  $A \$ B + C / D * E \% F / G * H$
7. Convert Infix expression to Prifix expression:
  - a.  $A + B / C * D + E / F + G / H$
  - b.  $P * Q * (R + S / T + U) / V + W$
  - c.  $A \$ B + C / D * E \% F / G * H$
8. Differentiate:
  - a. Linear Data Structure and Non linear Data Structure
  - b. Primitive Data Structure and Non Primitive Data Structure
  - c. Static Memory Allocation and Dynamic Memory Allocation

### Unit: 2 Queue and Linked List (Singly Linked List)

1. Define the following terms: Queue, Circular Queue, Double Ended Queue, Front, Rear
2. List out the types of Queue
3. Explain Simple Queue with advantages and disadvantages
4. Explain Priority Queue
5. Draw the representation of Circular Queue and explain it.
6. Draw the representation of Double Ended Queue and explain it.
7. Write an algorithm of Insert and delete operation in Simple Queue.
8. Write an algorithm of Insert and delete operation in Circular Queue.
9. Write an algorithm of Insert and Delete from front position in Double Ended Queue.
10. Write an algorithm of Insert and Delete from rear position in Double Ended Queue.
11. Write applications of a Queue.
12. Define Linked list. What is the difference between Array and Linked list?
13. Draw the representation of Single Link list and explain it.
14. Draw the representation of Single Circular Link List and explain it.
15. Write an algorithm of SLL for following operations:
  - Creation, Insertion in first, last, and middle position in SLL, Deletion from first, last and middle position in SLL, Merging two linked lists, Searching, Copying
16. Write an algorithm of SCLL for following operations:
  - Creation, Insertion in first, last, and middle position, Deletion from first, last and middle position, Merging two linked list, Searching , Copying

### Unit: 3 Linked Lists (Doubly Linked List) Sorting, Searching

1. Draw the representation of Double link list and explain it.
2. Draw the representation of Double Circular Link list and explain it.
3. Explain the application of Linked list.
4. Write an algorithm of DLL for following operations:
  - Creation, Insertion in first, last, and middle position, Deletion from first, last and middle position, Merging two linked list, Searching , Copying
5. Write an algorithm of SCLL for following operations:
  - Creation, Insertion in first, last, and middle position, Deletion from first, last and middle position, Merging two linked list, Searching , Copying
6. Explain the searching method: Binary and Linear, also differentiate them.
7. Explain following Sort:
  - Insertion Sort
  - Selection Sort
  - Quick Sort
  - Bubble Sort

### Unit 4: Conceptual View of Tree, Graph

1. Define Following terms:  
Tree, Root, Leaf, Node, Level, Height, Parent Node, Degree, Sibling, Child Node, Binary Tree, Complete Binary Tree, Link, Full Binary Tree, AVL Tree, Binary Search Tree.
2. List out the properties of Binary Tree.
3. Explain the applications of Tree.
4. Create a Binary Search tree with the help of following data:
  - 50, 23, 78, 90, 11, 34, 8, 5
  - 45, 15, 18, 29, 65, 55, 79, 85, 75, 12
  - 78, 12, 34, 67, 31, 22, 88, 56, 100, 93
  - 11, 22, 33, 44, 55, 66, 77, 88, 99
5. Format of Binary Tree From its traversals:
  - a. Inorder D B H E A I F J C G  
Preorder A B D E H C F I J G
  - b. Inorder n1 n2 n3 n4 n5 n6 n7 n8 n9  
Postorder n1 n3 n5 n4 n2 n8 n7 n9 n6
6. Explain AVL Tree with example.
7. **Define Following terms:** Graph, Digraph, Undirected Graph, Mixed Graph, Weighted Graph, Incident, Adjacent Vertices, Cycle, Self loop/Sling, Parallel Edges, Simple Graph, Complete Graph, Acyclic Graph, Isolated Graph, Path, Distance, Degree of Vertex, Indegree, Outdegree, Pendent Degree
8. Explain Set, Linked and Matrix Representation of Graph with example.
9. Explain BFS and DFS Traversal.
10. Explain the application of Graph.

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## BCA Semester IV

### BCA 405: Operating System

**Rationale:** Operating System and Programming provides the concept of operating system and its different components like process management, memory management, file management, device management.

**Learning Outcomes:** The students will be able to understand:

- Understand that what operating system.
- Management of different Components of Operating System like Process Management, Memory Management, File Management, Device Management, etc.
- Understand the Concept of Deadlock
- Understand the Concept of CPU Scheduling

**Teaching and Evaluation Scheme:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quizzes, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85%) and Internal marks.

#### Resource Required

- Projector

| Sub Code | Subject Title    | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|------------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                  | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 405  | Operating System | 4               | 4        | Internal    | External | Internal  | External |             |
|          |                  |                 |          | 30          | 70       | -         | -        |             |

#### Unit 1: Operating System and Process Management [25%]

**Application:** To understand how Operating System works? Which are main components of it.

**Operating System:** Definition and Meaning of Operating System, Types of Operating Systems, Operating System Services, Buffering, Spooling

**Process Management:** Introduction, Process States (Process Life Cycle), Process Control Block (PCB), Operations of Process, Process Scheduling Queue: Job Queue, Ready Queue, Device Queue

**Text Book Page No:** 1 to 6, 79 to 89

#### Unit 2: CPU Scheduler and Scheduling [25%]

**Application:** To understand the work of Scheduler and CPU scheduling algorithms,

**Schedulers:** Long-term schedulers, Medium-term schedulers, Short-term schedulers, Context Switch, **Process Scheduling Algorithms** (Non-Preemptive: FCFS, SJF and Preemptive: SJF, Round-Robin(RR), Priority Based/Event, Driven (ED), Multi-Level Queue (MLQ)),

**Scheduling Criteria:** CPU Utilization, Throughput, Turnaround time, Response time, Waiting Time

**Text Book Page No: 149 to 154**

**Unit 3: Deadlocks****[25%]****Application:** To understand types of Resources, Deadlock**Resources:** Preemptable-Non Preemptable, Resource Allocation Graph**Deadlock:** Definition, Causes for Deadlock, Deadlock Conditions,**Method for Handling Deadlocks:** Deadlock prevention, Deadlock Detection, Deadlock Recovery, Deadlock Avoidance**Text Book Page No:** 237 to 257**Unit 4: Memory, File and Disk Management****[25%]****Application:** To understand how operating system manages memory, file and disk internally.**Memory Management:** Logical and Physical address space, swapping, contiguous memory allocation–single process monitor, multiprogramming with fixed partitions, multiprogramming with dynamic partitions, non contiguous memory allocation methods- paging, segmentation, Demand paging, page replacement algorithms-Optimal Policy, LRU algorithm, FIFO algorithm**File Management:** File Concept, Access Methods, Directory Structure, File Allocation Methods, Free space Management.**Device Management:** Overview, Disk structure, Disk Scheduling algorithms: FCFS, SSTF, SCAN, LOOK, C-SCAN, C-LOOK**Text Book Page No:** 265 to 292, 306, 315 to 316, 359 to 369, 404 to 413,437, 440 to 445**Text Book**

Operating System Concepts – Silberschatz &amp; Galvin, Addition Wesley

**Reference Books**

1. Modern Operating System – Andrew S. Tanennbaum
2. Operating Systems – William Stallings.

**Question Paper Scheme:**

| <b>University Exam :</b> | <b>Duration 3 Hrs</b>                     | <b>Total Marks : 70</b> |
|--------------------------|---|-------------------------|
| Q.1-                     | Unit-I & II (Objective/Short questions)   | 11 Marks                |
| Q.2-                     | Unit-I (Descriptive / Long questions)     | 12 Marks                |
| Q.3-                     | Unit-II (Descriptive / Long questions)    | 12 Marks                |
| Q.4-                     | Unit-III & IV (Objective/Short questions) | 11 Marks                |
| Q.5-                     | Unit-III (Descriptive / Long questions)   | 12 Marks                |
| Q.6-                     | Unit-IV (Descriptive / Long questions)    | 12 Marks                |

## Question Bank

1. Explain the terms:  
Operating System, Process, Process Control Block, Scheduler, Deadlock, Resource Allocation Graph, Memory, Page, Frames, Page table, Frame Table, Internal Fragmentation, External Fragmentation, File, File Pointer, Logical Address space, Physical Address space, File Open Table, Swapping, Context Switch
2. Explain the services of Operating System.
3. Explain Process States.
4. Explain Process Control Block.
5. Explain all operations on process.
6. Explain Process Scheduling Queues.
7. Explain different CPU Scheduling Criteria.
8. Explain different CPU Scheduling Algorithms.
9. Explain different conditions of deadlock.
10. Explain different methods of deadlock detection.
11. Explain different methods of deadlock prevention.
12. Explain different methods of deadlock recovery.
13. Explain logical address space and physical address space.
14. Explain Contiguous memory allocation methods.
15. Explain Non contiguous memory allocation methods.
16. Explain paging with example.
17. Explain segmentation.
18. Explain demand paging.
19. Differentiate External Fragmentation and Internal Fragmentation.
20. Explain different page replacement algorithms.
21. Explain different Access methods of File.
22. Explain different Directory Structure.
23. Explain different File allocation methods.
24. Explain Free Space Management.
25. Explain Disk Scheduling algorithms.

**Kadi Sarva Vishwavidyalaya, Gandhinagar**  
**BCA Semester IV**  
**BCA 406: Application Development using VB.NET (P)**

**Teaching & Evaluating Scheme:** Teaching Scheme would consist of classroom board based teaching as well as Group activity, Role play and Problem solving of relevant real time data.

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quizzes, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85% ), Internal marks which consist of 15 (7.5 Term Work + 7.5 Sessional Exams) marks and External marks which consist of 35 for University examination.

| Sub Code | Subject Title                        | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|--------------------------------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                                      | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 406  | Application Development using VB.NET | 2               | 2        | Internal    | External | Internal  | External |             |
|          |                                      |                 |          | 15          | 35       | -         | -        |             |

**Practical task list / Practical Assignments**

1. How to Declare Various Variable and displaying values in labels
2. Write a program in VB.NET which will display the functionality of **isDate()** function
3. Write a program in VB.NET which will check if a assignment is numeric or not using **isNumeric()** function
4. Write a program in VB.NET showing the functionality to enter any two numbers in two different textboxes and create buttons of +, -, X, \, ^, / and MOD. Display the answer on label
5. Write a program in VB.NET which will ask the values from users and will display the result by using the functionality of **Select-Case**
6. Write a program in VB.NET which will display the functionality of **listbox**
7. Write a program in VB.NET which will display the functionality of **Combobox**
8. Write a program in VB.NET which will show the functionality of **WHILE - END WHILE** loop with the STEP in MINUS
9. Write a program in VB.NET which will show the functionality of **DO - LOOP WHILE**
10. Write a program in VB.NET showing the functionality of **FOR-NEXT** loop and displaying message on message box
11. Write a program in VB.NET which will show functionality of **For-Each** statement

12. Write an Application in Vb.net which transfer each data value from listbox1 to listbox2 by clicking of '>', '>>', '<', '<<' same with listbox2 to listbox1.
13. Write an Application in vb.net in which a **scrollbar** has value of 1 to 10 as per scrolling of it find out the square root and factorial number at proper labels.
14. Write a program in VB.NET which will on click of button open **OpenFileDialog** and display file name.
15. Write a program in VB.NET which will on click of button open the **FontDialog** and apply effect on **RichTextBox**
16. Write a program in VB.NET which will display images and display selected images in **picturebox using OpenFileDialog**
17. Write a program in VB.NET which will display the functionality of **colordialogbox** which will change the background color of the form runtime.
18. Write a program in VB.NET which will display the functionality of **TreeView control**
19. Write a program in VB.NET which will display the functionality of **Listview control**
20. Write a program in VB.NET which will **validate only Text data / Numeric data / Date data** in textbox using proper validation code
21. Write a program in VB.NET which creates menu and open and open various forms using this menu
22. Write a program in VB.NET which having Database Connectivity for **Sign Up** for new User
23. Write a program in VB.NET which having Database Connectivity for **Login** for existing User with **validation** and utility of **Timer Control**
24. Write a program in VB.NET which having Database Connectivity with **Insert – Update – Delete** some Product for **Product Table**.
25. Write a program in VB.NET which having Database Connectivity with **Insert – Update – Delete** some Product for **Product Table** using Wizard technique .
26. Write a program in VB.NET which having Database Connectivity with **Search Product with various criteria** from **Product Table**.
27. Write a program in VB.NET which having Database Connectivity with **Create Report / Parameter report** from **Product Table**.
28. Write a program in VB.NET which having Database Connectivity with **Create Chart / Parameter Chart** from **Product Table**.
29. Write a program in VB.NET which having Database Connectivity with **Search Product with using like operator on any criteria** from **Product Table**.
30. Write a program in VB.NET which having **Module functionality** for **declaring global variable** or **global connection** in VB.NET application Development

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## BCA Semester IV

### BCA 407: Data Structure (P)

**Rationale:** To understand the concepts and Implementation of Primitive and Non-Primitive Data Structures: Array, Stack, Queue, Linked List of Data Structure.

**Prerequisite:** Basic concepts of C programming language like Array, User defined functions, Structure, Dynamic Memory Allocation, Pointer

#### Learning Outcomes:

Student will be able to understand

- The concepts of Data Structure.
- Use of various concepts of Data Structures to develop efficient programs and managing different types of real and abstract data types.

#### Resource Required

- Lab Facility with Turbo C++
- Projector

#### Teaching Scheme & Exam Scheme:

| Sub. Code | Subject Title  | Teaching Scheme |             | Exam Scheme |          |           |          |             |
|-----------|----------------|-----------------|-------------|-------------|----------|-----------|----------|-------------|
|           |                | Cr.             | Hrs. / Week | Theory      |          | Practical |          | Total Marks |
|           |                |                 |             | Internal    | External | Internal  | External |             |
| BCA 407   | Data Structure | 2               | 4           | -           | -        | 15        | 35       | 50          |

#### Practical List

##### Unit 1: Introduction of data structure, Array Overview, Stack

- B? Implement the program of function
- C? Implement the program of Array
- D? Implement the program of Structure
- E? Implement the program of Switch case

##### Unit 2: Queue and Linked List (Singly Linked List)

1. Implement PUSH, POP, and display operation of Stack
2. Evaluate Infix expression to Postfix expression.
3. Implement Queue with insert, delete, and display operation
4. Implement insert at front and rear in Double Ended Queue
5. Implement delete from front and rear in Double Ended Queue
6. Implement insert, delete, and display in Circular queue

### **Unit 3: Linked Lists (Doubly Linked List) Sorting, Searching**

1. Implement the program of pointer.
2. Implement Singly Linked list with following operations:
  - a. Creation a linked list
  - b. Insertion at first position
  - c. Insertion at last position
  - d. Insertion at middle position
  - e. Deletion from first position
  - f. Deletion from last position
  - g. Deletion from middle position
  - h. Copying from one linked list to another linked list
  - i. Merging of two linked list
  - j. Searching a value
  - k. Traversal
3. Implement Singly Circularly Linked list with all the operations mentioned for Singly Linked List.
4. Implement Doubly Linked list with all the operations mentioned for Singly Linked List.
5. Implement Doubly Circularly Linked list with all the operations mentioned for Singly Linked List.

### **Evaluation Scheme:**

| Practical | Viva | Journal | Total |
|-----------|------|---------|-------|
| 21        | 7    | 7       | 35    |

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## BCA Semester IV

### BCA 408:Networking - I

**Rationale:** Networking -I focus on understanding of the concepts of Network Structures, communication systems, Transmission medias, Addressing Schemes, Subnetting and Errors during data transmission

**Learning Outcome:**

- Learn basic concepts of Networking
- Understanding of LANs and wireless LANs
- OSI and TCP/IP models
- Analog and digital communication systems
- Various transmission modes
- Addressing Schemes
- Logical Addressing
- Types of errors and Errors Correction and detection

**Resource Utilization:** Classroom Teaching, Projector, Internet

**Teaching and Evaluation Scheme:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quizzes, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85%) and Internal marks.

| Sub Code | Subject Title  | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|----------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 408  | Networking - I | 2               | 2        | Internal    | External | Internal  | External | 50          |
|          |                |                 |          | 15          | 35       | --        | --       |             |

**Unit 1 : Network fundamentals and data transmission**

**[50%]**

**Objective:** The main objective is to learn about the hardware, Network Structure, Data, Signals, Transmission Medium.

**Content:**

What is networking, Network elements - LAN, WAN, host, workstation, server, physical topologies, (bus, star, ring, mesh, and backbone), Common network connectivity devices (NIC, hub, Switch, router, gateway), Entities –sender and receiver, carrier, Virtual LAN, The OSI reference model, TCP/IP protocol suite, Analog and digital data and signals, Bandwidth, throughput, latency, Transmission Modes: Guided media ( twisted pair cable, coaxial cable, fiber optics cable), Unguided media ( radio waves, microwaves, infrared )

## Unit 2 : Addressing Schemes

[50%]

**Objective:** The student will be able to learn Addressing Methods, Creating subnets, Errors.

**Content:**

Addressing scheme (Port, physical, Logical and Specific addresses), IP Version 4, IP Version 6, Logical addressing scheme (dotted decimal notation , binary notation and address classes), Unicasting, multicasting, broadcasting, Subnetting ,What is Error detection and correction?, Types of errors – Single bit error and burst error

### Question Paper Pattern:

|                             |                     |                 |
|-----------------------------|---------------------|-----------------|
| University Examination      | Duration: 1.5 Hours | Total Marks: 35 |
| Q-1 Unit I & II             |                     | (11 Marks)      |
| Objective/Short Questions   |                     |                 |
| Q-2 Unit I                  |                     | (12 Marks)      |
| Descriptive/ Long Questions |                     |                 |
| Q-3 Unit II                 |                     | (12 Marks)      |
| Descriptive/ Long Questions |                     |                 |

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**Kadi Sarva Vishwavidyalaya, Gandhinagar**  
**BCA Semester IV**  
**BCA 409: Specialization (Robotics)**  
**Robopedia-1**

**Rationale:**

This is to enable students to have an understanding of Basic components of Robots Application based to build new robots along with Programming. Students will learn about Robot accessories to interface with display devices. The course covers basic ideas study of sensors to activate microcontroller after accumulating data.

**Learning Outcomes:** The student will be able to understand:

1. Basic components of Robots
2. Implementation technique of Robot Making
3. Project Based Learning

**Teaching and Evaluation Scheme:**

| Sub Code | Subject Title | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|---------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |               | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 409  | Robopedia-1   | 2               | 2        | Internal    | External | Internal  | External |             |
|          |               |                 |          | --          | --       | 15        | 35       |             |

**Course Content:**

**Unit 1: Introduction to micro-controller programming [25%]**

Programming using KEIL C in 8051, Data type used, Utilization of PORT 0-3, writing a program for the use of LCD, LED, 7 SEGMENT display.

AV Aids: Projector, Simulator **No. of hours: 05**

**Unit 2: Introduction to Processor and Electrical Components [25%]**

Simple Motion control using I/O ports, interfacing of peripherals to microcontroller, Geared DC Motor, Stepper Motor, Motor Driver, Relays, Solid State Drivers.

AV Aids: Projector, Simulator **No. of hours: 05**

**Unit 3: Interfacing of various kinds of devices [25%]**

Introduction to LCD interfacing, Analog Sensor, interfacing Analog to digital conversion  
 Interfacing with white line sensors, Infra-red range finder sensor

AV Aids: Projector, Simulator **No. of hours: 05**

#### **Unit 4 : Study of sensors to enable microcontroller to accumulate data**

[25%]

Sensors, Interrupt programming, closed loop position control using position encoders, Robot programming for white line following

AV Aids: Arduino board, Components, Projector, Simulator

**No. of hours: 05**

#### **Text book:**

Myke Predko, “Programming Robot Controllers” – McGrawHill, 1st edition, 2003.

#### **Reference book**

1. Robotics: Fundamental Concepts and Analysis, Oxford University Press, Second reprint, May 2008.
2. Michael Slater, “Microprocessor – based design: A comprehensive Guide to Effective Hardware Design”, Prentice Hall, 1989.

**Certification:** Robopedia-1

**Competency:** Basic Level

## **LIST OF PRACTICALS**

### **Build a Robot**

These robots give you the full EV3 experience, complete with building instructions, programming missions and the programming tool included in the new free EV3 Programmer App. New robot builders begin here!

Make Different Types of Sensors Robots:

- Various tasks like,
- Line follower robot.
- Obstacle avoider robot.
- Object follower robot.
- Photophobic robot.
- Phototropic robot.
- Fire fighter robot.
- Wall Follower.
- Sound Resistant Robot
- Mobile Control Robot
- Boomerang Robot

### **Explanation:**

- Line Follower Robot: - As the name suggests robot in this mode will follow a line. Our robot will follow white line on black surface or vice versa.
- Obstacle Avoider Robot: - In obstacle avoider robot, the robot will sense the obstacle and will change the path accordingly so it won't be colliding with any obstacle.
- Obstacle Follower Robot: - In obstacle follower robot, the robot will sense the obstacle and will follow the object accordingly.
- Photophobic Robot: - The meaning of "phobia" is to be afraid off, or fear. In photophobic robot our robot will sense the light and will try to move away from light.
- Phototropic Robot: - In phototropic robot our robot will sense the light and will try to move towards the light.
- Fire Fighter Robot: - : Our fire fighting robot will buzz when it will detect fire and also extinguish it.
- Wall Follower Robot: - We will design our robot in such a way that it will follow wall. The robot will not move away from wall or won't collide with wall.
- Sound Resistant Robot: - It will sense the direction from where the sound is coming and move away from it.
- Mobile Control Robot: - You can control your robot using your mobile phone from anywhere in the world.
- Boomerang Robot: - Whenever robot hits the wall it will take 180 degree turn and will come back to you.

**Kadi Sarva Vishwavidyalaya, Gandhinagar**  
**BCA Semester IV**  
**. BCA 409: Specialization (E-Commerce)**  
**E – COMMERCE TECHNOLOGY – 2**

**Rationale:**

To provides information about computerized E-Business, its rules, E-Commerce models, basic infrastructure for online transaction.

**Learning outcomes:**

- Able to know fundamentals of structure for electronic business system.
- Will allow you to know different models of E - Commerce.
- Provide Knowledge of basic requirements for network of online business.

**Teaching & Evaluating Scheme:** Teaching Scheme would consist of classroom board based teaching as well as Group activity, Role play and Problem solving of relevant real time data.

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of internal examinations which consist of Term Work such as class test, quizzes, class participation, home assignments, presentation, Regular Attendance (i.e. Minimum 85% ), Internal marks which consist of 15 (7.5 Term Work + 7.5 Sessional Exams) marks and External marks which consist of 35 for University examination.

| Sub Code | Subject Title             | Teaching Scheme |          | Exam Scheme |          |           |          |             |
|----------|---------------------------|-----------------|----------|-------------|----------|-----------|----------|-------------|
|          |                           | Cr              | Hrs/Week | Theory      |          | Practical |          | Total Marks |
| BCA 409  | E-Commerce Technology – 2 | 2               | 2        | Internal    | External | Internal  | External | 50          |
|          |                           |                 |          | --          | --       | 15        | 35       |             |

**Unit – I** **[50%]**

**E-Payment Systems:** Introduction to E-Payment Systems, Pre-requisite of E-payment system, Types of E-Payment: Third-Party Payment: RTGS, NEFT, IMPS, Credit Card System, Debit Card System, Bill Payment

**Mobile Payment System:** Digital Wallets (like PayTM, BHIM, Oxygen Wallet, BHIM etc ...), The Google Wallet etc ...,

**Unit – II** **[50%]**

**Case Studies**

- Net Banking System – Fund transfer
- Online Shopping etc. Flip Kart Amazon.com
- Stoke exchange
- Online Reservation System, etc Railway, flight, hotel

**Reference:**

1. Web Commerce Technology Hand Book by: Deniel Minilo, Emma minoli.
2. Introduction of E – Commerce Nidhi Dhavan International Books house