Shiksha Mandal's
Bajaj College of Science, Wardha
(Formerly known as Jankidevi Bajaj College of Science, Wardha)

SCHEME and SYLLABUS FOR
UNDERGRADUATE PROGRAMME (B. Sc.) IN COMPUTER SCIENCE

Programme Objective:

There are two main objectives to the B.Sc. Computer Science Programme.

a) The primary goal of the degree program in Computer Science is to provide students the foundations for the future work and careers in computation-based courses. These foundations support both a successful career path in computing as well as provide appropriate qualifications for further degree work in computation related disciplines. Our degree emphasizes development of analytical skills, acquisition of knowledge and understanding of systems, languages and tools required for effective computation-based problem solving.

b) A Computer Science major will provide you with knowledge of programming, operating systems, compiler design and principles of programming language. These skills will prepare graduates to enter technological fields such as systems programming, technical support, research and teaching.

On completion of the B.Sc Computer Science Programme, the students:

a) Will have sound knowledge of the Programming languages such as C, C++, Java, VB and SQL. Also they will have knowledge about Information Technology, Operating System, System Analysis and Design and Development.

b) Can participate in off-campus internships, independent study projects, part-time computer employment, lectures by guest speakers, Society of Computing Students programming and on campus employment as lab assistants, lab supervisors and Helpdesk assistants.

c) Be in a position to develop industrial and entrepreneur applications.

B. Sc. Semester III
DATA STRUCTURES and OPERATING SYSTEMS
Subject Code: UG-CS(05)-S3-T
Course Outline

Unit I

Linked List: Linked List, Representation of Single, Double, Header, Circular Single and Double Linked list, All possible operations on Single and Double Linked List using Dynamic representation, Polynomial Representation and its Manipulation.

Unit II

Stacks: Stacks terminology, Representation of Stacks in Memory, Operation on Stacks, Polish Notations, Translation of infix to postfix & prefix expression, Infix to Postfix Conversion, Evaluation of Postfix Expression, Recursion, Problems on Recursion, Quick Sort and Tower of Hanoi Problem.

Queue: Representation of Queues in Memory, Circular Queue. Dequeue and Priority Queue, Operations of above Structure using Array and Linked Representation.

Unit III

Sorting and Searching: Selection Sort, Insertion Sort, Merge Sort, Efficiency of Sorting Methods, Big-O Notations. Hash Tables, Hashing Technique, Collision Resolution Technique.

Trees: Basic Terminologies, Representation of Binary Trees in Memory, Traversing of Binary tree, Binary Search Tree, Operation on Binary Search Tree, Heap Tree, Operation on Heap Tree, Heap Sort Method.

Graphs: Basic Terminologies, Definition and Representation of Graphs in Memory: Linked List and Matrix Representation. Traversing graphs: BFS, DFS Method.

Unit IV

Structure of Operating System, Operating System functions, Characteristics of Modern OS. Process Management: Process states, Creation, Termination, Operations on Process, Concurrent processes, Process Threads, Multithreading, Micro Kernels.

CPU Scheduling: Schedulers, Scheduling Methodology, CPU Scheduling Algorithms: FCFS, SJF, RR, Priority Scheduling.

Unit V

Performance Comparison: Deterministic Modeling, Queuing analysis, Simulators. Deadlock and Starvation: Resource Allocation Graph, Conditions for

Dead Lock, Dead Lock Prevention, Dead Lock Detection, Recovery from Deadlock.

Memory Management: Logical Vs. Physical Address Space, Swapping, Memory Management Requirement, Dynamic Loading and Dynamic Linking, Memory Allocation Method: Single Partition allocation, Multiple Partitions, Compaction, paging, segmentation, segmentation with paging, protection.

Unit VI

I/O Management: I/O hardware, I/O Buffering, Disk I/O, Raid, Disk Cache.

File Management: File Management system, File Accessing Methods, File Directories, File Allocation Methods, File Space Management, Disk Space Management, Record blocking.

Protection Mechanisms: Cryptography, Digital Signature, User Authentication.

B. Sc. Semester III
COMPUTER SCIENCE PRACTICALS
Subject Code: UG-CS(05)-S3-P

Section A

1. Program to insert a node at the beginning, at the end and in the middle of the given linked list.
2. Program to delete a node at the beginning, at the end and in the middle of the given linked list.
3. Program to create a linked list of customer names and their telephone numbers. (Using Menu Driven and include features of adding a new Customer and deleting an existing Customer.)
4. Program to reverse a linked list.
5. Program to search a value in the given linked list.
6. Program to insert a node at the beginning, at the end or in the middle of a given doubly linked list.
7. Program to delete a node from the beginning, at the end or in the middle of a given doubly linked list.
8. Program to create, insert and delete a node in Circular linked list.
9. Program to push and pop an element into / from a stack implemented using linked list.
10. Program to push and pop an element into / from a stack implemented using Array.
11. Program to evaluate postfix expression.
12. Program to sort an array using quick sort.
13. Program to solve Towers of Hanoi problems using recursion.
14. Program to perform insertion and deletion operation in linear queues.
15. Program to perform insertion and deletion operation on circular queues.
16. Program to sort an array using: Insertion sort.
17. Program to sort an array using: Selection sort.
18. Program to insert an element in a binary search tree.
19. Program to traverse inorder of a binary tree.
20. Program to traverse preorder of a binary tree.
21. Program to traverse postorder of a binary tree.

Section B

Minimum five study experiments based on unit IV through Unit VI

REFERENCE BOOKS:

1. Classical Data Structures: D. Samantha. PHI, New Delhi.
2. DATA STRUCTURE : LIPSCHUTZ SCHAUM OUTLINE SERIES
3. Data Structures Using C++ : Y. Kanetkar
4. Data Structures Using C++: Tanenbaum
5. Data Structures by Tremblay Sorenson
6. Operating Systems by P. Balakrishna Prasad [Scitech Publication]
7. Operating System Concepts:Silberschatz (Addision Education)
8. Operating Systems – H.M. Deitel–Addision Wesley.
9. Operating Systems– John J. Donoven.
10. Operating System : A.S.Godbole (TMH)
11. Modern Operating Systems : Tanenbaum (Pearson Education)
12. Operating Systems : Peterson

Web Resources:

Students are advised to make use of the resources available on the Internet. Some useful links related to computer science are given below.

1. www.tutorialspoint.com/data_structures_algorithms
2. www.onlinetutorialspoint.com/data-structures/what-is-data-structures
3. www.topcoder.com/community/data-science/data-science-tutorials
4. www.tutorialspoint.com/operating_system
5. www.researchgate.net/publication/3786159_Tutorial

B.Sc. SEMESTER IV
JAVA PROGRAMMING and
LINUX OPERATING SYSTEM
Subject Code: UG-CS(05)-S4-T
Course Outline

Unit I

      Introduction to Java: History of Java, features of Java, getting started with Java. **Java programs:** Introduction of Application & Applets. **Variables:** Variable naming, variable initialization, assign values, Rules of variables, Scope of variable. **Operators:** Arithmetic, Assignment, Unary, Comparison, Shift, Bit- wise, Logical, Conditional, new, Special, Relational. **Data types:** Integers, Char, String, Float etc., Typecasting. **Tokens:** Java tokens, Order of precedence of operators, **Streams:** Input and output. **Creating a class & subclass:** Declaring a class, Naming a class, Rules to assign Class & Subclass, Creating a new object, Class of an object. **Data members:** Declaring data member, Naming variables, using class members. **Methods:** Using data members, Invoke a method, passing arguments to a method, calling method. **Access Specifiers & Modifiers:** Public, Private, Protected, Static & Final. **Overloading:** Method overloading, Constructor overloading. **Java class library:** Different types of classes.

Unit II

      Decision making & loops: If-then-else, Switch, ?: operator, While-loop, do-while loop, for loop. **Arrays:** Creating an array, one-dimensional array, two dimensional array. **String:** String array, string methods. **Inheritance:** Single & multiple inheritances. **Interfaces:** Defining interfaces, extending interfaces, implementing interfaces.

      Packages: Java API packages, creating packages, accessing packages, adding a class to packages. **Import statement:** Introduction & implementation of import statement. **Applets:** Introduction to Applets & Application, how applets and application are different, creating an applet. Applets life cycle, designing a web page, creating an executable applet, running the applet, applet tags, passing a parameter to applet, HTML tag, Converting applet to application. **Threads:** Overview of threads, single & multiple threads, life cycle of threads, stopping & blocking threads, working with threads, priority to thread, synchronization. **Exceptions & Errors:** Introduction, types of error, exception, syntax of exception, handling techniques, exception for Debugging.

Unit III

      Event: Event driven programming, handling an (AWT) events. **Graphics class:** Introduction, the Graphics classes, drawing & filling of lines, rectangle, circle & ellipse, arcs, polygons, text & fonts, creating a font class, font objects, text, coloring object. **Streams:** Introduction, Abstract stream classes, file input & output. **AWT Applications:** Creating a GUI using AWT toolkit, using component class, frames. **Components & Control:** Textfield, Textarea class, label, button, choice,

list, checkbox, class, and combo. **Menus:** Creating a popup menus. **Image:** Type of image, Properties of an image, Displaying an image. **Layouts:** Using Window Listener interface, Different types of Layout, Layout manager, Flow manager, Grid manager. Container: Different types of container (Frame, Dialog, Panel).

Unit IV

Logging In and Logging Out, Anatomy of Linux OS, Directory Structure, /usr Directory, **File Types:** User data files, System data files, Executable files. Naming files and directories, Spawning Processes. **Shell:** Creating User Account, Shell Program, bash shell, Changing shell prompt. **Commands:** Basic Syntax for a command, Exploring the Home Directory, ls, mkdir, rmdir, stat, cat, rm, mv, cp. **Editor:** Vi editor. **Hooking up Hardware Devices:** Formatting a Floppy Disk, Gathering important system information.

Unit V

Backing Up and restoring the File System: Simple Backup, gzip, gunzip, tar. **Printing files:** Print Spool directory, Sending files to Printer. **Sharing Files with other Users:** Maintaining User Accounts, Changing Password, Creating Group Accounts, Granting Access to files, Changing File Ownership, Protecting Files, Making a File Read-Only. **Working with Processes:** Types of processes, ps Command, Creating process, killing process, free command and top utility.

Unit VI

Managing Disk Space: df, du commands, Creating Additional Free Disk Space, Locating Unused Files, Setting System Clock. **Communication Utilities:** who, who am i, finger, mesg, write, wall, talk, Creating a message of the day. X Window System, **Graphical User Interfaces:** KDE and GNOME Desktop Environment.

B.Sc. Semester IV
COMPUTER SCIENCE PRACTICALS
Subject Code: UG-CS(05)-S4-P
Section A

1. A) Write a program that declares a class, object and also it accesses the data member of it's class.

   B) Write an applet that accepts a value from the user and display it.

2. A) Write a program that accept marks of 5 subject, calculate total, percentage and display the grade according to their percentage.

   B) Write a program that will print the multiplication table from 1 to 10.

3. A) Write a program to accept a set of values from the user into an array, display the values as well as their average.

   B) Accept string into a textfield, sort the characters in the string and display the sorted string into another textfield.

4. A) Write a program to demonstrate the overloading of constructor.

   B) Write an applet that accepts two numbers from user and display all the numbers between them.

5. A) Write a program to demonstrate the single inheritance.

   B) Write an applet to accept 10 numbers into an array, sort the array and display the sorted array. Accept the 10 numbers into the 10 different textfields.

   C) Write a program to create a multiple selection list and also display the list of items selected by the user.

6. A) Write an applet to demonstrate the user menu bar.

   B) Write a sample program that will convert the applet to application.

   C) Write a program to demonstrate the interfaces.

7. A) Write a program for exception handling that accept two numbers as textfields, the values are added and their sum is displayed. The code traps the error when user could enter text instead of numbers.

   B) Write a program that would accept input for the user and store it in a file called Test.java.

8. A) Write a program to implement Graphics class draw (line, rectangle, fill rectangle, circle, oval).

   B) Write an applet that display a choice of menu of three buttons (Add, Modify, Delete) selecting a choice from the menu should display the appropriate button. Use the show ( ) method of the Layout Manager.

9. A) Write a Java program to read and display the information from the file ABC.dat.

   B) Write a program to implement the concept of loading and displaying of images.

   C) Write a program to demonstrate the Animation in Java.

Section B

Minimum five study experiments based on unit IV through Unit VI

REFERENCE BOOKS:

1. The Art of Programming through Flowcharts & Algorithms by Anil B.Chaudhari, Firewall Media, Laxmi Publication, New Publication.
2. Programming with Java a Primer II edition: E Balagurusamy (TMH).
3. Java Programming (For Absolute Beginners) - Russell, PHI
4. Black Book on Java
5. Java-Complete References
6. Programming in Java Ist Edition – Dr. S.B.Kishor, Rajani Singh, Das Ganu Prakashan.
7. SAMS Teach Yourself Linux-Craig and Coletta Witherspoon [Techmedia]
8. LINUX Complete Reference by Richard Peterson
9. Linux Operating System Ist Edition - Dr. S.B.Kishor, Suhashini Chaurasia, Das Ganu Prakashan.

Web Resources:

Students are advised to make use of the resources available on the Internet. Some useful links related to computer science are given below.

1. www.tutorialspoint.com/cprogramming/
2. www.tutorialspoint.com
3. www.javatpoint.com/java-tutorial
4. www.tutorialspointexamples.com
5. http://www.javatpoint.com/linux-tutorial
6. http://www.guru99.com/unix-linux-tutorial.html
7. www.w3schools.com

B.Sc. SEMESTER V
VISUAL BASIC PROGRAMMING and
DATABASE MANAGEMENT SYSTEM
Subject Code: UG-CS(05)-S5-T
Course Outline

Unit I

Working with Visual Basic Window Components: Menu Bar, Tool Bar, Project Explorer Window, Form Layout Window, Properties Window, Toolbox, Code Editor Window **Working with Forms:** Properties, Events, Methods **Working with Basic Controls:** Label, Command Button, Text Box, Option Button, Frame, CheckBox, ListBox, ComboBox, Image, Scroll, Picture, Timer, DriveListBox, DirListBox, FileListBox and Shape Controls. **Basic Programming Fundamentals:** Variables, Data types, Constant, Conversion Function. **Scope of Variable:** Public, Private, Static. **Operators:** Logical, Arithmetic, Concatenation, Comparison. **Decision Structure:** If.. Then, If..Then..Else, Select Case.. End Case. **Loop Structure:** Do..While, While.. Wend, For.. Next, With.. EndWith. DoEvents ().

Unit II

Arrays: Dynamic Array, Preserve and Control arrays. **Procedure:** General procedure, General Methods for Passing Arguments to a Procedure, **Functions:** User-Interaction, String, Math, Date, Conversion Functions. **Modules:** Form, Standard.

Menus: Creating, Adding Menu Items, Creating Shortcut, Adding Separators Bars, Submenus, Code for Menus. **Creating Popup Menu:** System, Custom.

Unit III

Database Handling: Database Concepts, Creating and Accessing Database, Using Data Control. **Using DAO:** Creating Search Programs, Numeric Search and Complex Search Programs.

Using ADO Data Control: Data Link, ODBC Data Source name, Using Connection String, Creating Navigating buttons. **Working with Advanced Data Controls:** DataList Control, DataCombo Control, DataGrid Control and Msflexgrid Control. **Handling Errors:** Run Time, Trapping and Handling Error, ERR Object. Data Environment and Data Reports.

Unit IV

DBMS: Definition: Databases, DBMS, Problems with traditional file processing system, Objectives of the database systems, Three level architectures of DBMS, Components of DBMS, Database Administrator, Database Users, Data model, Different types of data models, Concepts of Hierarchical, Network Models.

E-R Models: Basic Concepts, Entity, Attributes, Relationship, Mapping, Keys, Weak and Strong Entity Set, Problems on E-R Diagrams.

Unit V

  Extended E-R Features: Specialization, Generalization, Aggregation, Problems on Reduction of an E-R Schema to Tables, Tabular representation of Strong, Weak entity Sets and Relationship Sets.

  Relational Model: Structure, Relational Algebra, Fundamental Operations, Set – Intersection, Natural Join, Division and Assignment Operation. Extended Relational Algebra Operations, Aggregate Functions.

Unit VI

  Functional Dependency: Functional Dependency, Fully Functional Dependency, Partial Dependency, Transitive Dependency, Multi Valued Dependency. **Normalization:** Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF, 5NF). Problems on Normal forms.

B. Sc. Semester V
COMPUTER SCIENCE PRACTICALS
Subject Code: UG-CS(05)-S5-P
Section A

1. A) Make an application in Visual Basic, which display a picture when
   i.   Command button with caption "click here" is clicked.
   ii.   After delay time 100ms (by using Timer Control).
   B) Design an application to find
   i.   sin x = x - x^3/3! + x^5/5! - x^7/7! + --------
   ii.   cos x = 1- x^2/2! + x^4/4! - x^6/6! + --------
   iii. Find an even /odd number.
   iv.   Find Factorial of number.
   v.   Find if number is a Prime or Not Prime.

2. A) A book stall gives discount on the books as per following conditions,

No. of books purchased	Discount
<=5	Nil
>5 and <=10	10%
>10 and <=15	12%
>15	20%

   Create a form as follows to calculate the discount.

   Unit Price   [   ]

   No. of Books   [   ]

   Total Price   [   ]

   Discount   [   ]

   Total Amount   [   ]

   B) Design a form for speed control program using scrollbars.

3. A) Design an application, which display a text and given choice to change text to bold, italic, underline (any one or in combination) using check box controls.
   B) Write a VB code to give five choices of colors. Design an application to choose any one color using option button and change the forecolor of TextBox Caption.

4. A) Write a program in VB to build application to display sorted list of group A & group B students in two list boxes. Make provision to shift name (s) on either side using List Box control.

   B) Write a program in VB to build application which display list of states. Make provision to display capital of the state and cities when a particular state is selected using combo box.

5. A) Write a VB Program to create an array of N elements. Find the frequency of elements and display the positions in an array.

   B) Create an application, which counts no. of characters and no. of words entered in TextBox.

6. Create Menus using Menu Editor as follows.

File
New
Open
Save
Exit

Edit
Cut
Copy
Paste

   And write appropriate code on click event of New and Exit menu options.

7. Create a database pay.mdb using Visual Database Manager with fields Code Number(n), Name of Employee(T), Designation(T), Address(T), Joining Date(d), Basic Pay(n), Status(T) [Permanent / Temporary],Department(T) [Purchase, Sales, Account]. Achieve connectivity using Data Control. Develop an application in VB to display data of employees using MSFlexgrid control as shown below with company's logo.

EMPLOYEE INFORMATION							\<logo\>
I.D	NAME	ADDRESS	DESIGNATION	DEPT.	Date of Joining	Status	BASIC

8. Design a menu as shown below.

DATABASE

Record

Open
Exit

Append
Save

   Create table pay.mdb using Visual Data Manager and connect it to VB

application using Data Control. Display/view records using DbGridControl. Create an application in VB to open database of employee pay.mdb by using menu option "OPEN". Use APPEND and SAVE options to add and save records in DATABASE.

9. Open database fees.mdb with fields:-
Name, Class, Fees using Visual Data Manager. Use Data control for connectivity. Develop a menu driven application in VB to:-
I)   Compute total fees class wise
II) Search a record of a particular student belonging to a particular class.

DATABASE	Record

Open
Exit

Compute total fees
Append
Save

10. Create a database College.mdb containing fields:-
Name, Class, Marks in Phy, Comp. Sc., Maths and Percentage using Visual Data Manager. Connect database to VB application using Data Control. Develop a Menu driven application in VB to
I)   Edit a record class wise.
II) Calculate class wise passing percentage where a student is declared "pass", if he/she gets percentage $>= 45$.
   Display class wise list of students who are placed in Ist Division. (Percentage $>= 60$)

DATABASE	Edit

Create
Display
Exit

B.Sc. - I
B.Sc. - II
B.Sc. - III

11. Create a table book.mdb using VDM containing fields:-
Name of Book, Subject, Price, Date of Purchase, Name of Publication. Develop a menu driven application in VB to:-
I)   Open Database.
II)   Delete a record of book.
III) Display subject wise list of book in proper format.

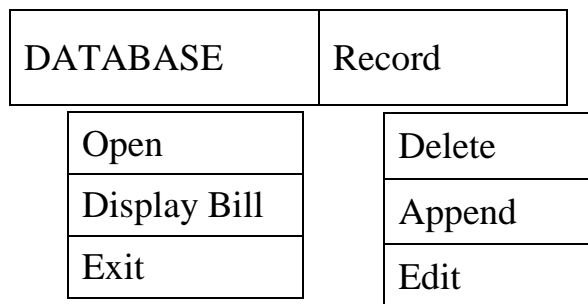| DATABASE	Record
Open	
Exit	Delete
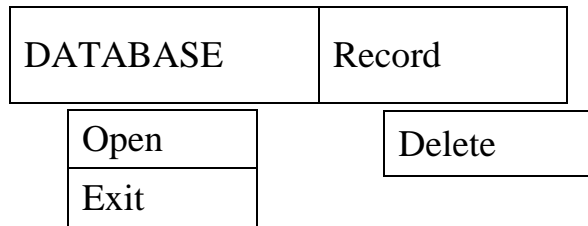
Use Data Control for connectivity.

12. Create a table using VDM to store required information for computing Electricity Bill.
    Charges are as follows:
    1) 1.25 / units for 1st 30 units.
    2) 2.90 / units from 31 to 300 units.
    3) 4.0 / units from 301 to onwards.

    Develop a menu driven application to:-
    I)   Open Database
    II)   Display Electricity Bill in proper format.
    III)   Delete a record of book
    IV)   Append a record.
    V)   Edit record

| DATABASE	Record
Open	Delete
Display Bill	Append
Exit	Edit

Use ADODC to achieve connectivity.

13. Create the Database emp.mdb having table emp_biodata directly through MS-Access and display record using DataGrid Control.
    Develop a menu driven application to:-
    I)   Open Database
    II)   Display records using DataGrid Control.
    III)   Search a record.
    IV)   Append a record.

DATABASE	Record
Open	
Display	
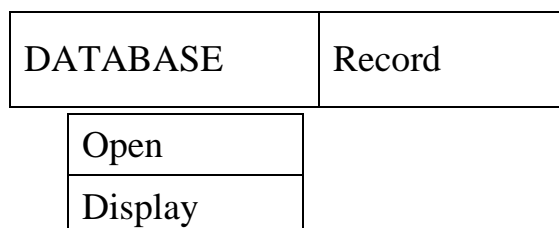
Exit

Append
Search

Use ADODC to achieve connectivity.

14. Create an application for employee salary sheet.
    If BASIC > 5000
        HRA= 40% of BASIC
        DA= 50% of BASIC
    If BASIC >= 2500
        HRA= 35% of BASIC
        DA= 45% of BASIC
    If BASIC >= 1500
        HRA= 30% of BASIC
        DA= 40% of BASIC
    Otherwise
        HRA= 20% of BASIC
        DA= 30% of BASIC
    TA=150
    PF= 15% of BASIC
    PT= 18% of BASIC

Develop a menu driven application in VB to:-
  I)   Compute Total Salary.
  II) Search a record of a particular employee belonging to a particular department.

DATABASE	Record

Open
Display
Exit

Compute Total Salary
Search

Use ADODC to achieve connectivity.

Note: -While designing menu, MDI forms are expected whenever required.

Section B

Minimum five study experiments based on unit IV through Unit VI.

REFERENCE BOOKS:
1. VISUAL BASIC – to Advance by Soma Dasgupta [BPB Publication]
2. Evangelos Petroutsos, Mastering Visual Basic 6.0 BPB Publication.
3. VISUAL BASIC 6 COMPLETE REFRENCE (TMH PUB)
4. Visual Basic 6 Deitel & Deitel (Pearson Education)
5. Mastering VB 6.0 Black Book -Peter - Norton-Techmedia
6. Front End Development Using Visual Basic 4th Edition –Dr. S.B.Kishor, Das Ganu Prakashan.
7. Data Base System Concepts By A SilbersChatz By Henry Korth And S.Sudarshan
8. Introduction to Data Base Management by NAVEEN PRAKASH [Tata McGrawHill Ltd.]
9. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.
10. Raghu Ramakrishnan & Johannes Gerhrke, "Data Base Management Systems".
11. Muzumdar, Introduction to Database Management Systems, TMH.
12. Database Management System – Dr. S.B.Kishor, Das Ganu Prakashan.

Web Resources:
Students are advised to make use of the resources available on the Internet. Some useful links related to computer science are given below.

1. www.tutorialspoint.com/listtutorials/visual-basic/1
2. www.vbtutor.net/vbtutor.html
3. www.visual-basic-tutorials.com
4. www.freetutes.com/learn-vb6
5. www.beginnersbook.com
6. www.w3schools.in/dbms
7. www.tutorialcup.com

B. Sc. Semester VI
COMPILER CONSTRUCTION, SQL and PL / SQL
Subject Code: UG-CS(05)-S6-T
Course Outline

Unit I

Compilers and Translators: Need, The Structure of a Compiler, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Optimization, Code Generation, Book Keeping, Error Handling.

Unit II

High Level Programming Languages: Definitions of Programming Languages, The Lexical and Syntactic Structure of a Language, Data Elements, Structures, Operators, Assignment Statements, Data Environments, Parameter Transmission, Storage management.

The Role of the Lexical Analyser: Approach to the Design of Lexical Analyzer, Implementation of Lexical Analyzer, Context Free Grammars, Derivations and Parse Trees, Ambiguous Grammar.

Unit III

Parsers: Shift-Reduce Parsing, Operator Precedence Parsing, Top-Down Parsing, Predictive Parsers, Symbol Table,

Code Optimization: The Principal Source of Optimization, Loop Optimization, DAG Representation of Basic Blocks.

Code Generation: A Machine Model, A Simple Code Generator, Register Allocation and Assignment.

Unit IV

CODD'S Rules, Oracle Database Objects, Sub Languages of SQL, Data Types, Operators. **DDL Statement:** Creating Tables, Deriving Table from Existing Table, Altering, Dropping Tables. Integrity Constraints, Specifying Names for the Constraints, Viewing Integrity Constraints, Adding and Dropping Constraints. **DML Statements:** SELECT statement, Insert, Update, Delete, Working with Sequences and Synonyms. **Built-in functions:** Arithmetic, Date, Character, Conversion, Single row, Aggregate, Decode. Joins, Set Operators and Sub queries. **DCL and TCL Statements:** Grant, Revoke, Commit, Rollback and Savepoints.

Unit V

VIEWS: Creating Views, Dropping Views, Inserting, Updating and Deleting Data using Views, Types of Views. **PL/SQL Programming:** PL/SQL Data Types, Identifiers, Operators and Expressions, Iterative Statements, Conditional Statements, Emphasis on Problems.

Exception Handling: Predefined Exceptions, User Defined Exceptions. **Cursors:** Declaring Cursors, Opening and Retrieving Records, Closing Cursors. Attributes of Explicit and Implicit Cursors, Parameter Passing in Cursors, Problems on Exception Handling, Cursors.

Unit VI

Procedures: Create and Drop Procedure, Creating Procedures with Parameters, Calling Procedures, Granting the EXECUTE Permission, Problems on Procedures.

Function: Creating and Dropping Function, Purity Levels in Functions, Executing Functions. **Triggers:** Create Triggers, Type of Triggers, Creating BEFORE and AFTER Triggers, INSTEAD-OF Triggers, Trigger Predicates, Inserting, Updating and Deleting Triggers, Enabling, Disabling and Dropping Triggers. Problems on Functions and Triggers.

B. Sc. Semester VI
COMPUTER SCIENCE PRACTICALS
Subject Code: UG-CS(05)-S6-P

Section A

1. DDL Statements :

    i) **Create the table Invoice with fields** inv_no(char, Primary Key), mv_no(number), cust_id(char), issue_date(date), return_date(date).

   Insert data in the table Invoice as follows:

inv_no	mv_no	cust_id	issue_date	return_date
101	1	a01	21-Dec-06	25-Dec-06
102	3	a02	19-Oct-06	30-Oct-06
103	5	a03	14-Jul-06	1-Aug-06
104	5	a04	15-Sep-06	30-Sep-06
105	6	a05	19-Oct-06	21-Oct-06
106	7	a06	1-Jan-06	15-Jan-06
107	8	a07	15-Aug-06	30-Aug-06
108	2	a05	1-Oct-06	15-Oct-06
109	4	a01	12-Sep-06	19-Sep-06
110	9	a02	1-Dec-06	15-Dec-06
111	6	a05	2-Feb-06	14-Feb-06
112	3	a06	1-Jan-06	10-Jan-06

ii) Modify Table Structure by adding new field price(number) and increase the size of inv_no.

iii) Add and drop constraints

    i. Add Primary Key constraint.

    ii. Drop Primary Key constraint.

    iii. Add Unique Key constraint.

    iv. Drop Unique Key constraint.

    v. Add Check constraint.

2. DML Statements:

    i) Add a record in the above table.

    ii) i) Change inv_no of I12 with 'I111'.

       ii) Change issue_date of customer of cust_id 'a01' to '22-Dec-06'.

       iii) Change movie no of cust_id 'a05' to 11.

       iv) Display all movies with issue_date between 01-Jan-06 to 01-Sep-06.

       v) Display information for cust_id 'a01' & 'a02'.

    iii) i) Delete records with inv_no 'I11' from invoice table.

       ii) Delete records having return date <='20-Jan-06'.

3. DCL and TCL Statements

    i) Grant insertion and deletion privileges on Invoice Table to another user XYZ.

    ii) Revoke the deletion privileges from user XYZ.

    iii) After insertion of 2 records in invoice table create Savepoint A.

    iv) Delete a record and create Savepoint B.

    v) Rollback to A.

4. Create the table Movie with fields mv_no(number, Primary Key), title(char), type(char), star(char), price(number), releasedate(date)

    i) Add few records in above table.

    ii) Count total number of customer.

    iii) Calculate total price of all the movies.

    iv) Calculate average price of all the movies.

    v) Determine the maximum & minimum movies prices and rename the title as MAX-PRICE and MIN-PRICE.

    vi) Count the number of movies having price greater than or equal to 150.

       vii)   Display total no. of movies released in the current year.

       viii)   Display all the movie which start with letter 'K'.

5. i) **Create a View** of table Invoice with following columns inv_no(char, Primary key), mv_no(number), cust_id(char).

ii) Insert and delete records.

iii) Drop view

6. **PL/SQL Programming:**

    Write a PL/SQL block:

    i)   To find largest of 2 numbers.

    ii)   To reverse the number.

7. **Cursor:**

    i) Write a cursor to fetch all the rows of table Invoice.

    ii) Write a cursor to display all the movies with issue_date between 01-Jan-06 to 01-Sep-06. If no record found then use Exception to display proper message.

    iii) Write a PL/SQL to accept the name and age of student and insert into table STUD after validating age not less than 18 otherwise raise exception.

8. **Create Procedure:**

    i) To swap two values.

    ii) To display the cust_id, mv_no and call the procedure through main program.

9. **Create Function:**

    i) To find gcd of two numbers.

    ii) To find the total price of all the movie starting with letter 'K' and call the function through main program.

10. **Create Trigger:**

    i) That restricts the user from performing a DML on movie table on 'Monday'.

    ii) Covert all the movie name into the upper case on insertion of each row.

Section B

Minimum five study experiments based on unit I through Unit III.

REFERENCE BOOKS:

1. Principles of Compiler Design - A.V. Aho, J. D.Ullman: Pearson Education.
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley Dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Louden, Thomson.
5. Compiler Construction - Dr. S.B.Kishor, Nishant Shastrakar, Das Ganu Prakashan.
6. Understanding ORACLE by Ivan Bayross [BPB Publication].
7. Database System Using Oracle: A Simplified Guide to SQL & PL-SQL: Nilesh Shah, PHI Publication.
8. Database Management Systems (Complete Practical Approach) by Sharad Maheshwari & Ruchin Jain, Firewall media.
9. Dr. P.S.Deshpande SQL & PL/SQL for Oracle 10g Black Book.
10. Scott Urman Programming PL/SQL TMH.
11. Oracle (SQL and PL/SQL Programming) 2nd Edition - Dr. S.B.Kishor, Das Ganu Prakashan.
12. Database Programming with Oracle - Dr. S.B.Kishor, Das Ganu Prakashan.

Web Resources:

Students are advised to make use of the resources available on the Internet. Some useful links related to computer science are given below.

1. www.tutorialspoint.com
2. www.symbolaris.com
3. www.w3schools.com
4. www.beginner-sql-tutorial.com/sql.htm
5. www.guru99.com/sql.html
6. www.sqlcourse.com
7. www.tutorialspoint.com/compiler_design/compiler_design_syntax_analysis.htm