

# Informatics Practices

## Learning Objectives:

1. To understand the application development environment.
2. To gain programming Skills in GUI Programming Tool and Database Creation in RDBMS.
3. To design, program and develop database application using GUI Programming Tool and RDBMS.
4. To learn database connectivity using Visual Basic as Front-end tool.
5. To develop ability to use the Open Source Technology.

## Competencies:

1. Student will become familiar with Application Development
2. Student will be able to develop & debug programs Independently.
3. Student can use SQL for storing and retrieving data from the RDBMS.
4. Ability to arrive at a normalized design of tables and other database objects in RDBMS.
5. Student will be able to develop a Client Server Application using Front end and Back end tools.

## Class XI (Theory)

Duration: 3 hours

Total Marks: 70

Unit No	Unit Name	Marks
1.	COMPUTER SYSTEM AND BUSINESS APPLICATIONS	10
2.	INTRODUCTION TO PROGRAMMING	30
3.	RELATIONAL DATABASE MANAGEMENT SYSTEM	30
		<b>70</b>

## UNIT 1: COMPUTER SYSTEM AND BUSINESS APPLICATIONS

Evolution of computers; Basics of computer and its operation: Functional Components and their inter-connections, concept of Booting;

Hardware concepts:

Diagram illustrating main parts of computers;

Central Processing Unit (CPU): Arithmetic Logic Unit (ALU), Control Unit, Memory Unit (RAM - Random Access Memory & ROM - Read Only Memory)

Role of Input, Processing and Output Devices in a computer system

Input devices: Keyboard, Mouse, Light pen, Touch Screens, Graphics Tablets, Joystick, Mic, MICR, OCR, Scanner, Smart Card reader, Barcode reader, Biometric sensor, web camera, digital camera;

Output Devices: Monitor/Visual Display Unit (VDU), Printer (Dot Matrix Printer, Desk jet/ Ink jet/ Bubble jet Printer, Laser Printer), Plotter, Speaker,

Secondary Storage Devices: Floppy Disk, Hard Disk, Compact Disk, Magnetic Tape, Digital Video Disk (DVD), Zip Drive; Units of Memory: Bit (Binary Digit), Byte, Kilobyte, Megabyte, Gigabyte.

Software Concepts:

Types of Software: System Software, Utility Software and Application Software.

System Software: Operating System, Language Compilers, Interpreters and Assembler;

Operating System: Need of operating systems, Functions of Operating System Types of operating system.

Utility Software: Compression tools, Anti Virus, File Management tools and Disk Management tools;

Application Software as a tool: Word Processor, Presentation Tool, Spreadsheet Package, Database Management System; Business software (for example: Inventory Management System, Payroll System, Financial Accounting, Hotel Management, and Reservation System);

Development of programming languages - Machine Language, Assembly Language, High Level Language (BASIC, COBOL, FORTRAN, PASCAL, C++); GUI based languages - Visual Basic, Visual C++; C#, Java, vb.net.

## **GUI Operating System**

**Important:** Students/Teachers can also perform similar operation on any operating system. It is advised that the teacher while using any one operating system, give a demonstration of equivalent features for the other operating system.

## **Windows**

General features, Elements of Desktop - Taskbar, Icon, Start button, Shortcuts, Folder, Recycle Bin, My Computer;

Start Menu: Program, Documents, Settings, Find/Search, Help, Run, Shut Down/Logoff;

Customization of Taskbar, start menu, Display properties (Wallpaper, Font Settings, Color Settings, Screen Savers);

Program Menu: Accessories - Calculator, Notepad, Paint, Word pad, Entertainments (CD Player, Sound Recorder, Media Player, Volume Controller); Internet Browsers – Mozilla Firefox, Internet Explorer, Netscape Navigator.

Control Panel: Add new hardware; Add new Software, Printer Installation, Date/Time, Mouse, and Regional Settings;

## **Documentation**

Purpose of using word processing software, opening a new/existing document, closing a document, typing in a document, saving a document, print preview, printing a document, setting up of page as per the specifications, selecting a portion of document, copying selected text, cutting selected text, pasting selected text; changing font, size, style, color of text; Inserting symbol; Formatting: Alignment – Left, Right, Center; Justification;

Industries and Business Computing: Types of Industries (Production, Shipping, Travel, Hotel, Insurance, Construction, Automobile), Applications of Business Computing in Industries.

## **UNIT 2: INTRODUCTION TO PROGRAMMING**

### **Programming Methodology:**

General Concepts; Modular approach; Stylistic Guidelines: Clarity and Simplicity of Expressions, Names, Comments, Indentation; Documentation and Program Maintenance; Running and Debugging programs, Syntax Errors, Run-Time Errors, Logical Errors;

Problem Solving Methodology and Techniques: Understanding of the problem, Identifying minimum number of inputs required for output, Step by step solution for the problem, breaking down solution into simple steps, Identification of arithmetic and logical operations required for solution, Using Control Structure: Conditional control and looping (finite and infinite);

### **Programming Tool: Visual Basic**

Introduction to Programming – Modular Programming, Object Oriented Programming, Event Driven Programming;

About Visual Basic (Object Based Programming Language), Rapid Application Development using Visual Basic; Concept of Project in Visual Basic, VB Project Options - Standard EXE, ActiveX DLL, ActiveX EXE, ActiveX Control, ActiveX Document DLL, ActiveX Document EXE, Addin, VB Application Wizard, IIS Application, DHTML Application;

Getting Familiar with Visual Basic User Interface - Pull-Down menus, Toolbar, Toolbox, Project Explorer, Properties Window, Form Layout window, Form, Immediate window;

Opening and Closing windows, Resizing and moving windows, Docking windows; Quitting Visual Basic;

Visual Basic Tool Box (Standard Window Controls) - Pointer, Picture Box, Label, Text Box, Frame, Command Button, Check Box, Option Button, Combo Box, List Box, Horizontal Scrollbar, Vertical Scrollbar, Timer, Drive List box, Directory List box, File List box, Shape, Line, Image, Data, OLE;

Object Naming Conventions, Event Procedures;

### **Programming Fundamentals**

Data Types: Integer, Long, Single, Double, Currency, String, Byte, Boolean, Date, Object, Variant;

Variables: Need to use variable, Declaring Variables, Variable Naming Convention, Assigning value to Variables, Data Types of variable, Scope and lifetime of Variables (Public and Private);

Menu Editor: Concept of Menus, Shortcut menus and Popup menus Designing Menu System, Menu Editor Dialog Box Options (Name, Index, Shortcut, HelpContextID, NegotiatePosition, Checked, Enabled, Visible, WindowList, Right Arrow, Left Arrow, Up Arrow, Down Arrow, Menu List, Next, Insert, Delete, OK, Cancel), To Create Menu Controls in the Menu Editor, Menu Naming Conventions, Setting the Name Property, Creating a Menu Control Array, Creating Sub Menus, Separating Menu Controls, Assigning Access Keys and Shortcut Keys, Controlling Menus at

Runtime-Enabling and Disabling Menu Commands, Displaying a Checkmark on a Menu Control, Making a Menu Control Invisible, Adding Menu Control at Runtime, Displaying Pop-Up Menu;

General Controls (Advance): Image List, Common Dialog Box, ADO DC, DB Combo, Media Player Control, DB Grid;

Adding a Toolbar: Creating an Image List, Adding Images to the Toolbar, To Add Code for the Toolbar Buttons;

Adding Status Bar: Adding Status Bar panels, Adding Time on the panel.

Dialog Boxes: Pre-defined dialog box, Custom dialog box;

### **UNIT 3: RELATIONAL DATABASE MANAGEMENT SYSTEM**

#### **Database Management System**

Introduction to database concepts: relation/Table, attribute, Tuple / Rows, field, Data, Concept of String, Number and Date values, Data type and Data Integrity (Domain and Referential Integrity). Candidate key, Alternate key, Primary Key, Foreign Keys; Data Normalization-first, second, third, BCNF normal form;

Examples of Commercially available Database Management System's (Back-End) – Oracle, MS-SQL Server, DB2, MySQL, Sybase, INGRES.

Examples of Front End Software's: Oracle Developer, Visual Basic, Visual C++, Power Builder, Delphi;

#### **RDBMS Tool :**

Interface with oracle, Login Screen, Entering Name and Password;

Classification of SQL Statements: DML (SELECT, INSERT, UPDATE, DELETE), DDL (CREATE, DROP, ALTER, RENAME, TRUNCATE), DCL (GRANT, REVOKE), TCL (COMMIT, ROLLBACK);

SQL SELECT Statement: SQL SELECT statement, Selecting All the Columns, Selecting Specific Column, Column Heading Default, Using Arithmetic Operators, Operator Precedence, Significance of NULL value, NULL values in Arithmetic Expressions, Defining and using Column Alias, Concatenation Operator (||), Duplicate rows and their Elimination (DISTINCT keyword), Role of SQL and SQL\*Plus in interacting with RDBMS, Displaying Table Structure (DESC command);

SELECT Statement Continued: Limiting Rows during selection (using WHERE clause), Working with Character Strings and Dates, Using Comparison operators, BETWEEN Operator, IN Operator, LIKE Operator, IS NULL Comparison, Logical Operators, Use of Logical Operators (AND/OR/NOT Operators), Logical Operator Precedence, ORDER BY Clause, Sorting in Ascending/Descending Order, Sorting By Column Alias Name, Sorting On Multiple Columns;

Functions: SQL Functions, Types of SQL Function (Single Row/Multiple Row), Single Row SQL Functions, Character Functions (Case Conversion/Character Manipulation), Case Conversion Functions (lower (), InitCap (), UPPER ()) Character Manipulation Function (CONCAT(), INSTR(), LENGTH(), TRIM(), SUBSTR(), LPAD()), Number Functions (ROUND(), TRUNC(), MOD()), Working with Dates (LAST\_DAY(), MONTHS\_BETWEEN(), NEXT\_DAY(), ADD\_MONTHS(), ROUND(), TRUNC()) Arithmetic Operation on Dates, Date Functions and their Usage, Data type Conversion Functions, Implicit and Explicit Conversion, TO\_CHAR Function with Dates, TO\_CHAR Function For Numbers, TO\_NUMBER and TO\_DATE Functions, NVL Function and its Usage, DECODE Function and its Usage;

Grouping Records: Concept of Grouping Records and Nested Grouping, Nested Grouping of records, Group Functions, Types of group functions (MAX(), MIN(), AVG(), SUM(), COUNT()), Using AVG and SUM Functions, Using MIN and MAX Functions, Using the COUNT Function, using COUNT(\*), DISTINCT clause with COUNT, Group Functions and Null Values, Using NVL Function with Group Functions, Grouping Records: Group By Clause, Grouping By More than One Column, Illegal Queries with Group By Clause, Excluding Group Results: Having Clause, Nesting Group Functions,

Sub Queries: Concept of Sub-Query, Sub Query to Solve a Problem, Guidelines for Using Sub Queries, Types of Sub-Queries (Single Row and Multiple Row) and (Single Column and Multiple Column); Single Row Sub-Query and its Execution;

Displaying Data From Multiple Tables: Concept of Join, Result of Join, Cartesian Product and Generating Cartesian Product example using Mathematical Set), Types Of Joins (EQUI, SELF, NON-EQUI, OUTER (LEFT and RIGHT)), Equi-join: Retrieving Records with Equi-join, Additional Search Conditions using AND operator, Short Naming Convention for Tables (Table Aliases), Non-Equi join and its Implementation, Outer-Join and Its Usage, Self-Join (Joining a table to Itself);



Manipulating Data of A Table/Relation: Concept of DML (Data Manipulation Language), INSERT Statement, Inserting New Rows, Inserting New Rows with Null Values, Inserting Date Values, Use of Substitution Variable to Insert Values, Copying Rows From Another Table, Update Statement to Change Existing Data of a Table, Updating Rows In A Table, Updating Rows Based on Another Table, Delete statement/ Removing Row/Rows from a Table, Deleting Rows Based on condition from another Table; Making Data Manipulation Permanent (COMMIT). Undo Data Manipulation Changes (ROLLBACK)

Database Objects: View, Table, Sequence, index, and Synonyms, DDL (Data Definition Language), Naming Convention, Creating Views, Creating Synonyms, Simple Views and Complex Views, Retrieving Data From a View, Querying a View, Modifying a View,

Including Constraints: Constraints, Concept of using Constraints, Constraint Guidelines, Defining Constraints, NOT NULL, UNIQUE KEY, PRIMARY KEY, FOREIGN KEY, FOREIGN KEY Constraint Keywords, CHECK, Adding a Constraint, Dropping a Constraint, Disabling Constraints, Enabling Constraints, Viewing Constraints, Viewing The Columns, Associated with Constraints;

Creation of a Table/Relation: CREATE TABLE Statement, Data types, The DEFAULT option, Creating Tables, Referencing Another User's Tables, Querying the Database Dictionary to view all tables in the Oracle Database, Creating a Table by Using a Sub-Query;

Managing Existing Tables and other Database Objects: The ALTER TABLE Statement, Adding a New Column in a Table, Modifying Existing Column, Dropping a Column, Renaming an Object, Truncating a Table, Adding Comments to a Table, Dropping Views, Dropping Synonyms, Dropping Tables; giving permission to other users to work on Created Tables and Revoking it (GRANT and REVOKE statement).

**1. Hands on Experience****15**

A problem should be given covering the following

- Table definition (The table must include constraints)
- A form with Label, Text, Command Button control, List Box, Drive List Box, Directory List Box, File List Box, Tool and Menu Bar (Any 4)
- DSN to access tables in the database
- For data connectivity (Activex Database Control)
- Change of Text box Control Properties to view Database fields

**2. Practical File****05**

The practical file should contain print outs from each of the following topics.

1. Create an application using Visual Basic with a Text Box control to accept a name from the user and print "Hello <Name>" in a message box. E.g. when user types his name as "Kamal Kant" in the text box and clicks OK button, a message "Hello Kamal Kant" should be displayed and if he clicks on Cancel button a message as "Bye Kamal Kant" should appear.
2. Create an Application having two Text Boxes on the Window. Get Title, First Name and Last Name in it. On clicking Ok button a message should appear by joining Title + First Name + Last Name. e.g. if user enters Prof. in Title, Rajyash in First Name, and Swami as Last Name then the message to be printed should be " Happy Deepawli Prof. Rajyash Swami".
3. Create an application to let user guess any number and click a Play button given on the form. On clicking the Play button the application will generate a random number. If the generated number is same as guessed by the user then display a message "You Win" otherwise display a message "You Loose"
4. Create an application to Display Image files kept in different folders in the system. The application should allow the user to navigate in the folders and list all Image Files (\*.BMP, \*.JPG) when ever a image file is selected it should get that picture displayed in an Image control.
5. Create an application having menu bar and tool bar to create a text file, navigate and open text files, edit text file and save changes made by the user.
6. Create a small application working as a general purpose calculator.(+, -, x, ÷)
7. SQL assignments (based on Demo Tables present in the ORACLE database for example Emp table, Dept table and SalGrade table):
  - Display all the records (all columns) from table Emp.
  - Display EmpNo and EName of all employees from table Emp.
  - Display Ename, Sal and Sal added with Comm from table Emp.
  - Display EName joined with Job with heading "Employee", Sal\*12 as "Total Salary" from table Emp.
  - Display distinct Sal of employees from table Emp..
  - Show the Structure of table Dept
  - Write a query to display EName and Sal of Employees whose salary is greater than or equal to 3000 from table Emp..
  - Write a Query to display employee name, salary and department number who are not getting commission from table Emp.
  - Write a Query to display employee Number, name, sal and sal\*12 as Annual Salary whose commission is not NULL from table Emp.
  - Write a Query to display employee name and salary of those employee who don't have there salary in the range of 1500 to 2000
  - Write a Query to display name, job, salary, and HireDate of employees who are hired between February 20, 1981, and May 1, 1981. Order the query in ascending order of HireDate.
  - Write a Query to display the name and hire date of all employees who were hired in 1982
  - Write a Query to display the name, job title and salary of employee who do not have manager.
  - Write a Query to display the name of employee whose name contains 'A' as third alphabet.
  - Write a Query to display the name of employee whose name contains 'T' as the last alphabet.
  - Write a Query to display the name of employee whose name contains 'M' as first alphabet 'L' as third alphabet.
  - Write a Query to display the name of employee who is having 'L' as any alphabet of the name.
  - Write a query to display the current system date.
  - Write a Query to display employee number, name, salary, salary increase by 15% expressed as a whole number. Label the column as New Salary.
  - Write a Query to display the employee's name and salary review date, which is the date after six months of HireDate.
  - Write a Query to display the employee's name and salary review date, which is the date after six months of HireDate in format of 'Sunday, 7 SEP, 1981'.

- For each employee display employee name and total number of weeks lapsed between HireDate and Today.
- For each employee display employee name and total number of days lapsed between HireDate and Today.
- Create a query that produces display in the following format  
<employee name> Earns \$<salary> Monthly and working as <Job >
- Write a query which displays the employee name with the first letter capitalized and all other letters lower case and length of there name string.
- Write a Query to to display the employee name and commission amount. If the employee does not earn commission, put “No Commission”.
- Write a query to display the grade of all employees based on the value of the column job as per following scheme:

JOB	GRADE
PRESIDENT	A
MANAGER	B
ANALYST	C
SALESMAN	D
CLERK	E
NONE OFTHE ABOVE	O

- Write a query to display the EName and DeptNo and DName for all employees using tables Emp and Dept.
- Write a Query to display employee name, department name and location of all employees who have manager number between 7500 and 7900.
- Write a Query to display the employee name, department number and all the employees that worked in the same department as a given employee.
- Write a Query to display employee name and HireDate of employees who are employed after Employee 'BLAKE'.
- Write a Query to display employee number, name and manager's name with their manager number.
- Write a Query to Display the Sum, Average, Highest and Lowest salary of the employees.
- Write a Query to Display the Sum, Average, Highest and Lowest salary of the employees grouped by department number.
- Write a Query to Display the Sum, Average, Highest and Lowest salary of the employees grouped by department number and sub-grouped by job.
- Write a query to display the number of employee with same job.
- Write a query to display the average of Highest and lowest salary of each department.
- Write a query to display the difference of Highest and lowest salary of each department having maximum salary > 4000.
- Write a query to display the employee name and job for all employee in the same department as 'ALLEN'
- Write a query to display employee name and salary of those who either work in department 10 or have salary greater than employee 7521.

Before the following exercise please ensure that you are provided with a table Employee with following description

**Table:** Employee

Name of Column	Type
ID	NUMBER (4)
First_Name	VARCHAR2 (30)
Last_Name	VARCHAR2 (30)
User_ID	VARCHAR2 (10)
Salary	NUMBER (9,2)

- Use DESCRIBE command to ensure the table structure.
- Add the following data in the above Table as instructed

ID	First_Name	Last_Name	User_ID	Salary
1	Dim	Joseph	Jdim	5000
2	Jagannath	Mishra	jnmishra	4000
3	Siddharth	Mishra	smishra	8000
4	Shankar	Giri	sgiri	7000
5	Gautam	Buddha	bgautam	2000

- Populate table with first record mentioning the column list in the insert clause.
- Populate table with next two records without mentioning the column list in the insert clause.
- Populate table with 4<sup>th</sup> record and enter only ID and First\_Name
- Populate table with 5<sup>th</sup> record and enter ID, User\_ID, and Last\_Name only.
- For record with ID = 4 update record with Last\_Name User\_ID and Salary.
- For record with ID = 5 update records with First\_Name and Salary.
- Make the changes permanent.
- Modify the Last\_Name, of the employee 3, to Gautam.



- Modify the Salary and increase it by 1000, for all who get salary less then 5000.
- Delete the employee record having First\_Name as Siddharth.
- Make the changes permanent.
- Remove the entire contents of the table
- Undo the above step.
- Create a table Employee1 with columns ID, First\_Name and Dept\_ID from table Employee and also confirm the existence of table Employee1
- Create a view VU\_Emp1 which should include column EmpNo, EName and DeptNo from the table Emp.
- Create a view VU\_Emp2 which should include column EmpNo, EName and DeptNo from the table Emp and change the column headings as EmpNumber, Employee, Department.
- Select VIEW\_NAME and TEXT from the data dictionary USER\_VIEWS.
- Create the table Department table based on the following table instance chart.

Column Name	ID	Name
Data Type	NUMBER	VARCHAR2
Length	8	25

- Populate the table Department with data from table dept. Including only required columns.
- Create the table Employee based on the following table instance chart.

Column Name	ID	First_Name	Last_Name	Dept_ID
Data Type	NUMBER	VARCHAR2	VARCHAR2	NUMBER
Length	8	25	25	8

- Rename table Employee1 to Employee2.
- Drop table Employee2.
- Drop table Employee and Department
- Create table Customer as per following Table Instance Chart.

Column Name	Cust_ID	Cust_Name	Cust_Add1	Cust_Add2	Pincode	Cust_Phone
Key Type						
Nulls/Unique						
Fk Table						
Fk Column						
Datatype	number	varchar2	varchar2	varchar2	number	varchar2
Length	7	30	20	30	6	10

- Add one column Email of data type VARCHAR2 and size 30 to the table Customer.
- Change the data type of column pincode to VARCHAR2(10) in the table Customer.
- Add one more column CustomerIncomeGroup of datatype VARCHAR2(10).
- Insert few records with relevant information, in the table.
- Drop the column CustomerIncomeGroup from table Customer.
- Create table Department as per following Table Instance Chart.

Column Name	DeptID	DeptName	DeptLocation
Key Type	Primary		
Nulls/Unique		NOT NULL	
Fk Table			
Fk Column			
Datatype	NUMBER	VARCHAR2	VARCHAR2
Length	2	20	20

- Create table Employee as per following Table Instance Chart.

Column Name	EmpID	EmpName	EmpAdd	Phone	EmpSal	DeptID
Key Type	Primary					Foreign
Nulls/Unique		NOT NULL				
Fk Table						Department
Fk Column						Dept_ID
Datatype	number	varchar2	varchar2	varchar2	number	varchar2
Length	6	20	30	10	9,2	2

- Create table Employee1 as per the above Table Instance Chart but now use table level primary key addition method.
- Create table Employee2 as per the above Table Instance Chart without any constraint while table creation.
- Add a PRIMARY KEY constraint to the table Employee2 using the EmpID column.
- Add a FOREIGN KEY reference on the Employee2 table that will ensure that employee records with non-existent departments are to be prohibited.
- Confirm that constraints were added by querying Constraint\_Name and Constraint from USER\_CONSTRAINTS relation.

- Add a NOT NULL constraint to the table Employee2 on column EmpName.
  - Add a CHECK constraint to ensure, at the time of record insertion, that employee records with salary less than 2000 are to be prohibited.
  - Disable NOT NULL Constraint on the column EmpName from the table Employee2
  - Drop UNIQUE constraint from the column DeptName in table Department
8. Create an application to list all the contents of a database table using a data control object in visual basic.
9. Create an Application in Visual basic having Menu Bar tool baer and other controls to View, Add and Modify records present in the Database Tables.

### 3. Project

05

The following case study is to be used to develop a team project.

A cable company in Delhi is working since 1998. They have about 2 Lac customers in different zones (North, South, East, and West). Company wants to computerise its working, which involves Customer Registration, Customer Billing, and Bill Collection on monthly basis.

Develop a Database Handling Software for the company. The software should have option to enter customer data and information of bill collection. The data entry form should also have option to navigate through the records.

The software should allow to store following information of customer and billing (Normalize this to store data in tabular form).

Customer Name  
Customer Address  
Customer City  
Customer Zone  
Customer Pin Code  
Customer Phone  
Customer Interest (Movies, Games etc)  
Customer Monthly Income  
Customer Monthly Installment  
Customer Joining Date  
Bill Cycle  
Bill Collection Date  
(Suitable assumptions can be made)

The user interfaces should be designed in visual basic and must be user friendly with correct tab order.

Note: Similar type of cases can also be encouraged, provided it should include almost every aspect of course undertaken.

### 4. Viva Voce

05

Five questions from topics covered in the curriculum



## Class XII (Theory)

Duration: 3 hours

Total Marks: 30

Unit No	Unit Name	Marks
1.	BUSINESS COMPUTING	10
2.	PROGRAMMING	30
3.	RELATIONAL DATABASE MANAGEMENT SYSTEM	30
		<b>70</b>

### UNIT 1: BUSINESS COMPUTING

#### Introduction to Open Source based software:

Terminology: OSS, FLOSS, GNU, FSF, OSI, W3C.

Definitions: Open Source Software, Freeware, Shareware, Proprietary software, Localisation, UNICODE

Softwares : Linux, Mozilla web browser, Apache server, MySQL, Postgres, Pango, OpenOffice, Tomcat, PHP, Python

Websites: [www.sourceforge.net](http://www.sourceforge.net), [www.openrdf.org](http://www.openrdf.org), [www.opensource.org](http://www.opensource.org),  
[www.linux.com](http://www.linux.com), [www.linuxindia.com](http://www.linuxindia.com), [www.gnu.org](http://www.gnu.org), [www.i18n.com](http://www.i18n.com)

General concept, User interfaces (Front End), Underlying Database (Back End), Integration of User Interface and Database;

More application areas of Databases:

Inventory control, Financial Accounting, Pay-Accounting System, Invoicing Management System, Personal Management System / HRD System, Fees Management system, Result Analysis System, Admission Management System, Income Tax Management System;

Advanced Program Development Methodology: System Development Life Cycle, Relational Database Concept, Relational Database, Management System, Data Models (Entity Relationship Model), Entity and Entity Set, Attributes (Single, Composite and Multi-Valued), Relationship (One-to-One, One-to-Many and Many-to-Many), Entity Relationship Modeling Conventions, Communicating with an RDBMS using SQL, Relational Database Management System, SQL Statements, About programming language in SQL.

Data Dictionary, Data Warehousing, Data Mining, Meta Data;

Object Modeling: Introduction to object oriented modeling using Unified Modeling Language (Concepts only).

Client Server Computing: Concept of Client Server Computing.

### UNIT 2: PROGRAMMING: Visual Basic

#### Review of Class XI;

#### Programming Fundamentals

Modules: Modules in Visual Basic- Form Modules, Standard Modules, and Class Modules;

Procedures: Procedures (General, Event, Function, Property);

Control Structures:

Decision Structure – IF, IF-THEN-ELSE, Select Case;

Looping Structure- Do While...Loop, Do...Loop While, For...Next, For Each...Next;

Functions: Concept of Functions, Defining and Use of User Defined functions, function to perform calculations, Parameterized Functions;

Library Functions (System Functions)

String Function: Space( ), Str( ), Right( ), Left( ), Mid( ), InStr( ), Len( ), Ltrim( ), Rtrim( ), Ucase(), Lcase( ), String( );

Numeric Function: Sgn( ), Val( ), Int( );

Time-Related Function: Now( ), Time( ), Minute( ), Month( );

Miscellaneous Function: MsgBox( ), InputBox( );

Types of forms: Single Document Interface (SDI) and Multiple Document Interface (MDI);

MDI Applications: Creating MDI form and Child form, Arranging Child Forms;

Visual Basic Project: Properties, Component and References, Data Environment;

Accessing database from ORACLE using ODBC or ADO or OLEDB;

Accessing Databases: Using ODBC and OLE DB to connect with database.

Data Control: Accessing Data with the Data Control, Using Data-Aware Controls, Using Data Control Properties – Database Name, Exclusive, Options, Read Only, Record Source, Data Control Methods – Refresh, UpdateControls, UpdateRecord;

Bound Controls: Adding Bound Text and Bound Label Controls. Data-Bound list Boxes, Grids, and Sub-Forms

ADO (ActiveX Data Objects): Connection Object, Command Object, and RecordSet Object, Special ADO Properties – Connection String (using single table), Command Text, Command Types, Cursor Locations, Cursor Types, Lock Types, Mode Types.

ADO Data Control: Simple Data linking using ADO Data Control Methods, ADO Data Control Events.

### **UNIT 3: RELATIONAL DATABASE MANAGEMENT SYSTEM**

Review of RDBMS from Class XI

#### **Database Fundamentals**

Concept of Database Transaction, Committing a Transaction, Concept of “All or None” in a Transaction, Network Protocols Required (TCP/IP) for Data Communication, Stored Procedures, Concept of Database Fragmentation and Distributed Databases

#### **PL/SQL (Programming Language in SQL)**

Importance of Writing Procedures,

Declaring Variables: About PL/SQL, PL/SQL Block Structure, Program Constructs, Use of Variables, Handling Variables in PL/SQL, Types of Variables, Declaration, Naming Rules, Assigning Values to Variables, Initialization, and Keywords, Scalar Data types, Base Scalar Data Types, Scalar Variable Declaration, %TYPE attribute: for variable declaration, Declaring Boolean Variables, PL/SQL Record Structure, Referencing Non-PL/SQL variables, DBMS\_OUTPUT.PUT\_LINE;

Writing Executable Statements: PL/SQL Block Syntax and Guidelines, SQL functions in Code, SQL Functions in PL/SQL, PL/SQL Functions, Data type Conversion, Nested Blocks and Variable Scope, Operators in PL/SQL, Using Bind Variables, Programming Guidelines, Determining Variable Scope, SQL Statements in PL/SQL, Retrieving data in PL/SQL, Manipulating Data using PL/SQL, Inserting Data, Updating Data, Deleting Data, Naming Conventions, Commit and Rollback Statements, SQL Cursor, and Cursor Attributes;

Writing Control Structures: Controlling PL/SQL Flow of Execution, IF statements, IF-THEN-ELSE Statement Execution Flow, IF-THEN-ELSIF Statement Execution Flow, Building Logical Conditions, Logic Tables, Boolean Conditions, Iterative Control: LOOP Statement, Basic Loop, FOR Loop, While Loop;

Creating Procedures: Overview of Procedures, Syntax for Creating Procedures, Developing Stored Procedures and its Advantages, Creating a Stored Procedure, Procedure Parameter Modes, Creating Procedures with Parameters, IN and OUT parameters and Usage, DEFAULT Option for Parameters, Removing Stored Procedures;

Writing Cursors: Introduction to Cursors (Implicit and Explicit), Explicit Cursor Functions, Controlling Explicit Cursors, Declaring, Opening and Closing the Cursor, Fetching data from the Cursor, Explicit Cursor Attributes (%ISOPEN, %NOTFOUND, %ROWCOUNT), controlling multiple fetches, Cursors and Records, Cursor FOR Loops, Cursor FOR Loops using Sub Queries.

Triggers: Types of Triggers: Row-Level Triggers, Statement Level Triggers, BEFORE and AFTER Triggers, INSTEAD of Triggers, Valid Trigger Type, Trigger Syntax, Combining Trigger Types, Enabling and Disabling Trigger, Replacing Trigger, Dropping a Trigger.

Development of Data Base Applications (Application Domain):  
Student database for school, Employee database for a company, Library Database for Library  
Student database management system for school, Employee database management system for a company, Library Database management system for Library, Railway Reservation System, Hotel Reservation, Inventory Control System;





## Class XII (Practical)

**Duration: 3 Hours**

**Total Marks 30**

### 1. Hands on experience

**15**

A problem should be given covering the following features

1. Start a Standard Exe Project and it should contain MDI form with Menu Bar and Tool Bar (with Images)
2. Table structure in the database for the application with Constraints (Primary Key, Foreign Key, Check, and Unique).
3. A New Form to place an ADO component on it, for accessing data in table Stored Procedure to perform transactions/ conditional update
4. Trigger (any)
5. Making executable files of the project.

### 2. Records

**05**

1. Create an Application using Visual Basic for Students Information System Having a Student Table in Relational Database and a Student Data Form in Visual Basic to enter data into the database.
2. Create an Application using Visual Basic for Criminals Information System Having a Criminal Table in Relational Database and a Criminals Data Entry Form in Visual Basic to enter data into the database. The Data entry form should contain form level and Field level checks using procedures.
3. Create an Application using Visual Basic for Nursing Home Automation System having Linked tables (for example: Patient, Employee, Bill) in Relational Database and a required Data Entry Forms in Visual Basic to enter data into the database. The Data entry form should contain form level and Field level checks using procedures. Use of Bound Controls and Sub-Forms are to be encouraged in this application.
4. Create a database handling application for Student Expert System. Following features are to be incorporated in the application:
  - a. Create following linked tables of Student in the Relational Database.
    - i. StudentMaster : containing general information about the student.
    - ii. StudentDetail: Table to store data having details such as Class, Section, Marks and other relevant information.
    - iii. StudentFeeDetail: Should contain details like Financial Year, Class, Fee, FeeStatus( such as Paid and UnPaid)
    - iv. Accounts: General Accounts table to store fee collection details such as received from, date, chequeno and other relevant information.
  - b. The database should have Procedures to update data, Insert data and to perform other database transactions.
  - c. Database triggers should also be defined wherever automatic data modification is required.
  - d. Visual basic forms for data entry.
  - e. Procedures in Visual Basic to perform Database Transactions and Commit changes made
  - f. Reporting tool to make the MIS reports, required to analyse data entry.

### 3. Project

**05**

The following case study is to be adopted for the development of project

A book publishing company B R Publishing Group is in existence since 1950. They were untouched with latest technological inventions. They are still using a traditional approach of bookkeeping and accounts maintenance.

A company, Nova technology, introduced themselves as system integrator and developers who can change existing working system into the latest concept of paper less office. They wanted few details from the company about its working. The details are as under:

- Name of the company is B R Publishing Group.
- The company is having 20 employees. One Managing Director, Two Managers (Work manager and Marketing Manager) and 17 employees who work as a team for book publishing.
- The company publishes book in different Indian languages and different topics.
- Every book involves an Author and its detail.
- The book is sold in the market at a variable discount options

- Book Seller: 30%
- Schools: 20%
- Customer: 15%
- The company is maintaining information about Author and all its details such as Personal Information, Royalty etc.
- The company manages information about the book such as Book Name, Author, Quantity Sold, Quantity in Stock, etc.
- The company maintains Customer (Book Sellers) information. Books Sold, Subject, Language, and Amount Pending etc.
- Reports are required at different levels, such as
  - Customer Listing
  - Book Listing
  - Language Wise Book Listing
  - Topic Wise Book Listing
  - Pending Amount Listing (Customer Wise, Book Wise)
  - Author Royalty Detail
  - Bill Generation etc.

As a developer you are required to design the project and develop it as per customer needs (Developer can also visit a publishing company to collect customer details and live data). Suitable assumptions can be made during implementation. A proper normalized database is to be maintained in the RDBMS and the front end is to be developed using advanced interface controls. User-friendly interface is to be generated.

*Note: This is a sample case study. Similar type of cases can be developed on different application areas such as Library, Hospital, Transport Authority, Transporters, Wholesale Merchants, and Chemist Shops etc. The cases to be developed should preferably be obtained from live situations.*

#### **4. Viva Voce**

Five questions from topics covered in the syllabus

**05**

### Reference Books:

- Mastering Visual Basic 6 – Petroustos (BPB)
- Mastering Database Programming with Visual Basic 6 - Petroustos (BPB)
- Advanced Visual Basic 6 Project – Bay Ross (BPB)
- Programming in Visual Basic 6 - Bay Ross (BPB)
- Visual Basic 6 Complete – Sybex (BPB)
- MCSD: Visual Basic 6 Desktop Applications Study Guide– Michael (BPB)
- Successful Projects in Visual Basic – Christopher (BPB)
- Oracle8: The Complete Reference – George Koch, Kevin Loney (TMHP)
- Visual Basic Black Book (IDG)
- Mastering Visual Basic.NET Database Programming - Petroustos (BPB)
- Programming in Visual Basic - McBride (BPB)
- Mastering Oracle 8i – Freeman (BPB)
- Learn Oracle 8i – Ramalho (BPB)
- TEACH YOURSELF SQL / PL SQL USING ORACLE 8i & 9i with SQL J – BAYROSS (BPB)
- Visual Basic and ORACLE SSI Press
- Oracle Programming with Visual Basic – Snowdon (BPB)
- Quan Book 'O' Level all Vol. – DOEACC (BPB)