

INFORMATICS PRACTICES

Learning Objectives:

- To gain working knowledge of a computer system and peripherals
- To understand the application development process.
- To gain programming skills in front-end development
- To gain skills in Relational Database Creation and management.

Competencies:

- Sound knowledge of computer system
- Familiarity with Application Development process using simple IDEs
- Ability to use, develop & debug programs independently.
- Ability to use to store and retrieve data from the RDBMS.

CLASS XI (Theory)

Unit	Topic	Period		Marks	
		Theory	Practical	Theory	Practical
1	INTRODUCTION TO COMPUTER SYSTEMS	15	05	10	02
2	INTRODUCTION TO PROGRAMMING	40	35	25	16
3	RELATIONAL DATABASE MANAGEMENT	40	35	30	6
4	SYSTEM IT APPLICATIONS	5	15	5	6
		100	90	70	30

UNIT 1: INTRODUCTION TO COMPUTER SYSTEMS

Hardware Concepts:

Computer organization (basic concepts): CPU, Memory (RAM and ROM), I/O devices, communication bus, ports (serial, parallel); device specific ports

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

Output Devices: Monitor/Visual Display Unit (VDU), LCD screen, Television, Printer (Dot Matrix Printer, Desk jet/ Inkjet/ Bubble jet Printer, Laser Printer), Plotter, Speaker;

Secondary Storage Devices: Floppy Disk, Hard Disk, Compact Disk, Magnetic Tape, Digital Versatile Disk (DVD), Flash Drive, Memory cards - Comparative properties of storage media;

Memory Units : Bit (Binary Digit)/Byte (Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte)

Security of computer system: sources of attack and possible damages, malware-virus and related entities – virus, Trojan, spyware, worms, propagation of these entities, virus detection using a tool, Digital certificates, Digital signature, cookies, firewall, password, file access permissions.

Types of Software:

- (a) System Software

- (i) Operating systems, Need for operating system, major functions of Operating System,
 - (ii) Language Processors: Assembler, Interpreter and Compiler
- (b) Utility Software : Compression tools, disk defragmenter, anti-virus.
- (c) Application Software:
- (i) General Purpose Application Software: Word Processor, Presentation Tool, Spreadsheet Package, Database Management System;
 - (ii) Specific Purpose Application software (for example: Inventory Management System, Purchasing System, Human Resource Management System, Payroll System, Financial Accounting, Hotel Management and Reservation System, etc.);
- (d) Developer Tools: Compilers/ Interpreters, Integrated Development Environment (IDE)

UNIT 2: INTRODUCTION TO PROGRAMMING

Getting started with Programming using IDE

- Introduction, Rapid Application Development using IDE - Integrated Development Environment; Familiarization of IDE using basic Interface components- Label, Text field, Text Area, Button, Checkbox, Radio Button (As per appendix B)
- Developing General Application (As per the guidelines at appendix B) – Getting familiar with Java Swing User Interface components – Frame, Dialog, Option Pane, Label, Text Field, Password Field, Text Area, Button, Check Box, Radio Button, Combo Box, List, Table.
- Basic component handling methods and properties:
Set Text, Get Text, Add, isSelected, setSelected.

Programming Fundamentals

Data Types: Concept of data types; Built-in data types - byte, short, int, long, float, double, char, String, Boolean.

Variables:

Need to use variable, Declaring Variables, Variable Naming Convention, Assigning value to Variables;

Integer object method: parseInt

Double object method: parse double, parse float

Control Structures:

Assignment Statement

Decision Structure - if, if-else, switch;

Looping Structure- while, do-while, for;

Programming Guidelines:

General Concepts; Modular approach; Stylistic Guidelines: Clarity and Simplicity of Expressions, Names, Comments, Indentation; Running and debugging programs, Syntax Errors, Run – Time Errors, Logical Errors.

Problem Solving Methodology: Understanding of the problem, Identifying minimum number of inputs required for output, breaking down problem into simple logical steps,

UNIT 3: RELATIONAL DATABASE MANAGEMENT SYSTEM

Database Management System

Introduction to database concepts: Date Base, Relation/Table, attribute/fields, Tuple / Rows;

Data Types - Number, Character and Date

Key - Primary Key, Candidate key, Alternate key; Foreign key

Examples of common Database Management System- MySQL, INGRES, POSTGRES, ORACLE, DB2, MS SQL, Sybase.

Introduction to mySQL

(ANSI SQL 99 standard commands)

Classification of SQL Statements:

DML - SELECT, INSERT, UPDATE, DELETE;

DDL - CREATE, DROP, ALTER;

Creating and using a database : SQL CREATE command to create a database, USE command to select a database.

Creating a table: CREATE command to create a table, DESC command to display a table structure, INSERT command for : Inserting NEW Rows with Null Values, Inserting NUMBER, CHAR and Date Values.

Displaying Table Data: Select command for Selecting all the Columns, Selecting Specific Column, Using Arithmetic Operator Precedence, Defining and using column Alias, Eliminating duplicate values from display (DISTINCT Keyword), Limiting Rows during selection (using WHERE clause), Working with Character Strings and Dates, Working with NULL values.

- Using Comparison operators - =, <, >, <=, >=, < >, BETWEEN, IN, LIKE(%), Logical Operators -AND, OR, NOT; Operator Precedence;
- ORDER BY Clause, Sorting in Ascending/Descending Order, Sorting By Column Alias Name, Sorting On Multiple Columns;

Manipulating Data of a Table/ Relation : Update command to Change Existing Data of a Table, Delete command for removing row(s) from a Table.

Restructuring a table : ALTER TABLE for adding new column(s), deleting a column.

Functions in MySQL:

String Function - CHAR(), CONCAT(), INSTR(), LCASE(), LEFT(), LOWER(), LENGTH(), LTRIM(), MID(), RIGHT(), RTRIM(), SUBSTR(), TRIM(), UCASE(), UPPER().

Mathematical Functions - POWER(), ROUND(), TRUNCATE().

Date and Time Functions - CURDATE() , DATE(), MONTH(), YEAR(), DAYNAME(), DAYOFMONTH(), DAYOFWEEK(), DAYOFYEAR(), NOW(), SYSDATE().

UNIT 4: IT APPLICATIONS

- e - Governance - Definition, Benefits to citizens, e-Governance websites and their salient features and societal impacts; e-Governance challenges.
- e - Business - Definition, Benefits to customers and business, e-Business websites and their salient features and societal impacts; e-Business challenges.

- e - Learning - Definition; Benefits to students (Learners), Teachers (Trainers) and School (Institution) Management; e-Learning websites and their salient features and societal impacts; e-Business challenges.

In each of the above domains, identify at least two real-life problems, list the input(s) required for the expected output (s), and describe the problem solving approach.

Practical (Class XI)

Sl. No.	Description	Marks
1	Problem Solving using Java	12
2	SQL Queries	4
3	Practical Record <ul style="list-style-type: none"> • Productivity Tools • Simple Problems using Java • SQL Queries • IT Applications 	8
4	Viva Voce	6
Total		30

Evaluation of Practical Examination

1. Problem Solving using Java

Student is required to solve programming problems based on all concepts covered in theory throughout the year and maintain record of these in the file. Student will be given a problem to be solved using Java during final practical examination to be conducted at the end of the academic session

2. SQL Queries

Student will be trying out SQL queries in MySQL throughout the year along with course coverage in theory. Student will be asked to write 4 queries based on one or two tables during final practical examination to be conducted at the end of the academic session

3. Practical Record File

A practical record file is required to be created during the entire academic session. It should be duly signed by the concerned teacher on regular basis and is to be produced at the time of Final Practical Examination for evaluation. It should include the following:

- Print out of at least 2 documents with use of Different Style, Page Setting/Formatting, Bulleted/ Numbering and Tabulation
- Print out of at least 2 spreadsheets with simple calculations, basic functions, macros and graphs/charts
- At least 10 solutions of simple problems using IDE based Java (refer to Appendix 'A' & 'B')
- At least 3 IT applications – problems solving framework

- At least 20 SQL queries.

Viva Voce

Students will be asked oral questions during practical Examination to be conducted at the end of the course. The questions will be from the entire course covered in the academic session. Out of 6 marks, 2 marks are allotted to test student’s understanding of basic computer hardware and their functions.

CLASS XII (Theory)

Unit	Topic	Period		Marks	
		Theory	Practical	Theory	Practical
1	NETWORKING AND OPEN STANDARDS	20	4	10	02
2	PROGRAMMING	42	40	25	16
3	RELATIONAL DATABASE MANAGEMENT SYSTEM	42	36	30	8
4	IT APPLICATIONS	6	20	5	4
		110	100	70	30

UNIT 1: NETWORKING AND OPEN STANDARDS

Computer Networking:

- Networking - a brief overview.
- Communication Media : Wired Technologies – Co-axial, Ethernet Cable, Optical Fiber, Wireless Technologies – Blue Tooth, Infrared, Microwave, Radio Link, Sattelite Link.
- Network Devices : Hub, Switch, Repeater, Gateway and their functions
- Types of network - LAN, MAN, WAN, PAN
- Network Topologies: Star, Bus, Tree
- Network protocols : HTTP, TCP/IP, PPP
- Identifying computers and users over a network : Basic concept of domain name, MAC (Media Access Control), and IP Address, domain name resolution.
- Network security - denial of service, intrusion problems, snooping;

Open Source Concepts:

- Open Source Software (OSI norms), common FOSS examples (Gnu/Linux, Firefox, OpenOffice), common open standards (OSS) common FOSS/FLOSS examples (e.g.Gnu/Linux, Firefox, OpenOffice, Java, netbeans, MySQL), common open standards (WWW, HTML,XML,ODF, IP,TCP)
- Indian Language Computing: character encoding, UNICODE, different types of fonts (open type vs true type, static vs dynamic), Entering Indian Language Text - phonetic and keymap based.

UNIT 2: PROGRAMMING

Review of Class XI;

Programming Fundamentals

Refer to Appendix A for sample guidelines of GUI Programming, and Appendix B for Swing Control Methods & Properties)

Basic concepts of Access specifier for classes, Members and methods, Basic concept of Inheritance.

Commonly used libraries: String class and methods: toString(), concat(), length(), toLowerCase(), toUpperCase(), trim(), substring()

Math class method: pow(), round()

Accessing MySQL database using ODBC/JDBC to connect with database.

Web application development: URL, Web Server, Communicating with the web server, concept of Client and Server Side.

HTML based web pages covering basic tags - HTML, TITLE, BODY, H1..H6, Paragraph (P), Line Break (BR), Section Separator (HR), FONT, TABLE, LIST (UL, OL), FORM; Creating and accessing static pages using HTML and introduction to XML

UNIT 3: RELATIONAL DATABASE MANAGEMENT SYSTEM

Review of RDBMS from Class XI

Database Fundamentals

Concept of Database Transaction, Committing and revoking a Transaction using COMMIT and REVOKE,

Grouping Records: GROUP BY, Group functions - MAX(), MIN(), AVG(), SUM(), COUNT(); using COUNT(*), DISTINCT clause with COUNT, Group Functions and Null Values,

Displaying Data From Multiple Tables: Union, Equi-Join and Cartesian Products; concept of Foreign Key;

Creating a Table with PRIMARY KEY and NOT NULL constraints, Viewing Constraints, Viewing the Columns Associated with Constraints using DESC command; ALTER TABLE for deleting a column, ALTER TABLE for modifying data types of a column for adding a constraint enabling constraints, dropping constraint.

DROP Table for deleting a table;

UNIT 4: IT APPLICATIONS

Front-end Interface - Introduction; content and features; identifying and using appropriate component (Text Box, Radio Button, CheckBox, List etc.) as learnt in Unit-2 (programming) for data entry, validation and display;

Back-end Database - Introduction and its purpose; exploring the requirement of tables and its essential attributes;

Front-End and Database Connectivity - Introduction, requirement and benefits

Demonstration and development of appropriate Front-end interface and Back-end Database for e-Governance, e-Business and e-Learning applications)

Impact of ICT on society: Social and Economics benefits and Info mania.

Class XII (Practical)

Sl. No.	Description	Marks
1	Problem Solving using Java	10
2	SQL Queries	4
3	Practical Record • Simple Problems using IDE Java • SQL Queries • IT Applications	6
4	Project Work	4
5	Viva Voce	6
Total		30

Evaluation of Practical Examination

Problem Solving using Java

10 marks

Student is required to solve programming problems based on all concepts covered in theory throughout the year and maintain a record of these in the practical file.

Student will be given a problem to be solved using Java during practical Examination to be conducted at the end of the academic session.

SQL Queries

5 marks

Student will be trying out SQL queries in MySQL throughout the year along with course coverage in theory.

Student will be asked to write 4 queries based on one or two tables during final practical Examination to be conducted at the end of the academic session.

Practical Record File

A practical record file is required to be created during the entire academic session. It should be duly signed by the concerned teacher on regular basis and is to be produced at the time of Final Practical Examination for evaluation. It should include the following:

- At least 24 SQL queries based on one and/or two tables
- At least 12 solutions of simple problems and 2 IT applications using IDE based Java (refer to Appendix 'A' & 'B')
- Solution of at least 2 simple problems incorporating Java Application & Database connectivity

Project File

Students in group of 2-3 are required to work collaboratively to develop a project using Programming and Database skills learnt during the course. The project should be an application in any one of the following domains - e-Governance, e-Business and e-Learning with GUI front-end corresponding database at the back-end.

Viva Voce

Students will be asked oral questions during practical Examination to be conducted at the end of the course. The questions will be from the entire course covered in the academic session.

References

Suggested Reference Books

Introduction to Computer System:

1. V. Rajaraman, Fundamentals of Computers, 4th Edition, Prentice Hall of India
2. Peter Norton, Introduction to Computer, 4th Edition, Tata McGraw Hill.

Introduction to Programming:

1. Heiko Bock, The Definitive Guide to the NetBeans Platform 6.5, Apress

Relational Database Management System:

1. Lerry Ulman, MYSQL Database, Pearson Education, 2008

Computer Networking:

1. A.S.Tanenbaum, Computer Network, 4th Edition, Prentice Hall of India P.Ltd.
2. William Stallings, Data Communications and Networks, 5th Edition, Prentice Hall of India P.Ltd.

Suggested Websites on e-Governance

- www.mit.gov.in
- www.esevaonline.com
- bhoomi.kar.nic.in
- aponline.gov.in
- www.chips.nic.in

Suggested websites on e-Business:

- www.salesforce.com
- www.zoho.com
- www.itcportal.com

Suggested Websites on e-Learning:

- www.moodle.org
- www.atutor.ca
- www.w3schools.com
- portal.unesco.org

Appendix 'A'

Sample Guidelines for GUI Programming

1. To display a message using Label, Textbox, MessageDialog using simple GUI applications
2. To concatenate two text entries and display using simple GUI application
3. To perform a simple arithmetic operation (+, -, x, /) and display the result in MessageDialog or TextBox using simple GUI application
4. To perform a simple arithmetic operation (+, -, x, /) and display the result in TextBox using simple GUI application
5. To make simple decision making (if statement) solution and display relevant message using GUI application (Example-Problems related to Eligibility for a given value of Age, "Profit" or "Loss" messages for given values of Cost Price and Sale Price, Grade Display for given values of Marks of students etc.)
6. To create a simple GUI application to perform both arithmetic and logical operation together (Example – Total, Average and Grade calculation for given marks, Salary Calculation on different criteria)
7. To create a simple GUI application to perform an operation based on the criteria input by the user in a CheckBox or a RadioButton
(Example 1: Find the Discount of an item on the basis of Category of item (Electrical Appliance/Electronic Gadget/Stationary specified using a Radio button) and its Cost (Below 1000/above 1000/equal to 1000 specified using a Radio Button))
(Example 2: Calculate the incentive of a Sales Person on the basis of his Sales Amount, Customer Feedback. Count of Customer specified using CheckBox)
8. To create a simple GUI application to change the property of a swing element based on the selection made by the user
(Example 1: To change the background or foreground color of any of the Swing elements of the form based on the color selected from a list)
(Example 2 : To change the foreground and background color of a label based on the values input/stored in a combo box)
9. To create a simple GUI application for repeatedly doing a task based on the user input.
(Example: To display the multiplication table of a number input by the user)
10. To store the data (Admission No., Name, Date of Birth, Class and Section) of 10 students in a table (Table) and find total number in each class and section.
11. To create a simple GUI application that counts and displays the number of records present in a database table
12. To create a simple GUI application that displays the records of a database table in a tabular format (using jTable) on the GUI form.
13. To create a simple GUI application that displays the records of a database table in a tabular format(usingjTable) on the GUI form based on a criteria input by the user.
14. T create a simple GUI application to perform a calculation based on a value retrieved from database table and a value entered by the user in a GUI application.

Appendix 'B'

Swing Control Methods & Properties

Class	JButton
Swing Control	jButton 1, j Button2, jButton3,...(default)
Methods	getText(), setText()
Properties	Background, Enabled, Font,Foreground, Text, Label
Class	JLabel
Swing Control	jLabel1, jLabel2, jLabel3,...(default)
Methods	getText(), setText()
Properties	Background, Enabled, Font, Foreground, Text
Class	JTextField
Swing Control	jTextField1, jTextField2,jTextField3,...(default)
Methods	getText(),isEditable(), isEnabled(), setText()
Properties	Background, Editable, Enabled, Font, Foreground, Text.
Class	JRadioButton
Swing Control	jRadioButton1, jRadioButton2, jRadioButton3,...(default)
Methods	getText(), set Text(), isSelected(), setSelected()
Properties	Background, Button, Group, Enabled, font, Foreground, Label, Selected, Text
Class	JCheckBox
Swing Control	jCheckBox1, jCheckBox2, jCheckBox3,...(default)
Methods	getText(), setText(), isSelected(), setSelected()
Properties	Button Group, Font, Foreground, Label, Selected, Text
Class	J Button Group
Swing Control	J Button Group 1,(default)
Methods	
Properties	Add
Class	JComboBox
Swing Control	jComboBox1, jComboBox2, jComboBox3,(default)
Methods	getSelectedItem(), getSelectedIndex(), setModel ()
Properties	Background, ButtonGroup, Editable, Enabled, Font, Foreground, Model, SelectedIndex, SelectedItem, Text.
Class	JList
Swing Control	jList1, jList2, jList3,...(default)
Methods	getSelectedValue()
Properties	Background, Enabled, Font, Foreground, Model, SelectedIndex, SelectedItem, Selection Mode, Text.
Class	JTable
Swing Control	Jtable1, jTable2, jTable3, ...(default)
Methods	addRow(), getModel()
Properties	model
Class	JOptionPane
Methods	showMessageDialog(), showInputDialog(), showConfirmDialog()

Class	DefaultTableModel
Methods	getRowCount(), removeRow(), addRow, ()

Commonly used Methods

Class	Methods
Integer	parsoInt(), toDouble(), toString()
String	Concat(), length(), substring(), toDouble(), toLowerCase, toUpperCase (), trim()
Double	parseDouble(), toString(), toInt()
Math	Pow(), roun()
Connection	createStatement(), close ()
DriverManager	getConnection ()
Statement	executeQuery()
ResultSet	Next (), first (), last (), getString ()
Exception	getMessage ()
System	Exit ()

Note: The visual properties of any of the elements and Data connectivity methods (the properties/methods, which are not highlighted in the above tables) will not be tested in the Theory examination but may be used by the student in the Practicals and Projects.