15. INFORMATICS PRACTICES (Code No. 065)
(2017-18)

Learning Outcomes:

● Sound knowledge of computer system.

● Ability to develop application using simple IDEs.

● Ability to use, develop & debug programs independently.

● Ability to store and retrieve data using an RDBMS.

COURSE DESIGN
Class – XI (2017-18)

Unit	Topic	Periods			Marks
		Theory	Practical	Total	
1	Introduction to Computer systems	20	08	28	10
2	Introduction to Programming	45	42	87	25
3	Relational Database Management System	50	45	95	30
4	IT Applications	10	20	30	05
	Total			**240**	**70**

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 Screen, Graphics Tablet, Joystick, Microphone, OCR, Scanner, Smart Card reader, Barcode reader, QRCode 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, Byte (Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte)

● Encoding scheme :ASCII,ISCII & UNICODE

● E-waste disposal.

Security of computer system: Sources of attack and possible damages, malware – virus, worms, spyware and cookies as security threat, malware detection using a tool. Computer security, digital certificate, digital signature, firewall, password, file access permissions

Types of Software:

(a) System Software:

(i) Operating systems: Need for operating system, major functions of Operating System; Examples of OS for mainframe (eg: Linux etc), PC/Server (eg: Windows, Ubuntu etc.), and mobile devices eg: Android, ios and Symbian.

(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, Integrated Development Environment (IDE)

(ii) Specific Purpose Application Software: Inventory Management System, Purchasing System, Human Resource Management System, Payroll System, Financial Accounting, Hotel Management and Reservation System etc.

Unit 2: Introduction To Programming

Getting started with Programming using IDE

- Introduction, Rapid Application Development using IDE (Integrated Development Environment) such as Netbeans; Familiarization of IDE using basic Interface components- Label, Text Field, Text Area, Button, Checkbox, Radio Button. (*As per appendix A*)
- Developing General Application (*As per the guidelines at appendix B*) - Getting Familiar with Java Swing User Interface components-Frame, Dialog, OptionPane, Panel, ScrollPane, Label, TextField, PasswordField, TextArea, Button, CheckBox, RadioButton, ComboBox, List
- Basic component handling methods and properties: setText(), getText(), 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: parseDouble, parseFloat
- Control Structures:

  Decision Structure – if, if-else, switch;

  Looping Structur*e*- while, do . . while, for;

Programming Guidelines:

- General Concepts; Modular approach;
- Stylistic Guidelines: Clarity and simplicity of expressions and 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*: Database, Relational database, Relation/Table, Attribute/Field, Tuple / Row;
- *Data Types*: Text (CHAR, VARCHAR), Number (DECIMAL, INT/INTEGER), Date and Time
- *Keys*: Candidate key, Primary key, Alternate key, Foreign key;

- *Examples of common Database Management System*: MySQL, Ingres, Postgres, Oracle, DB2, MS SQL, Sybase etc.; Common Database management tools for mobile devices (eg: SQL Lite, Postgres SQL).

Introduction to MySQL

(ANSI SQL 99 standard commands)

- *Classification of SQL Commands*:

  DML - SELECT, INSERT, UPDATE, DELETE

  DDL - CREATE, DROP, ALTER

- *Creating and using a database*: CREATE DATABASE command to create a database, USE command to select a database.

- *Creating a table*: CREATE TABLE command to create a table, DESC command to display a table structure, INSERT command for inserting new rows, inserting new rows with NULL values and values of all the studied data types.

- Selection and Projection of a table.

- *Displaying table data*: SELECT command for selecting all the columns, selecting specific column(s), use of arithmetic operators.

- Defining and using column alias

- Eliminating duplicate values from display using DISTINCT keyword

- Limiting rows during selection (using WHERE clause)

  ➢ Using Comparison operators - =, <, >, <=, >=, <>, BETWEEN, IN, LIKE(%,_);

  ➢ Logical Operators –AND, OR, NOT and corresponding operator precedence;

- Working with NULL values.

- 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) and deleting column (s) and modifying column Structure. DROP command to delete a database or a table.

Functions in MySQL:

- *String Functions*: ASCII(), CHAR(), CONCAT(), INSTR(), LCASE(), UCASE(), LEFT(), LOWER(), LENGTH(), LTRIM(), MID(), RIGHT(), RTRIM(), SUBSTR(), TRIM(), 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; netbanking, mobile banking, e-Business challenges.

- *e-Learning*: – Definition, benefits to students (learners), teachers (trainers) and school (Institution) management; MOOCs (Massive Open Online Courses) ; e-Learning websites and their salient features and societal impacts; e-Learning 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. Conceptualise the design of an ICT based national mission.

Impact of ICT on society – social environmental and economic benefits, Infomania.

CLASS XI (PRACTICAL)
(2017-18)

S.No.	Description		Marks
1	Problem solving using Java		10
2	SQL queries		5
3	Practical Records:		6
	Application of Productivity Tools (WP,Spreadsheets,Presentation)	2	
	Simple problems using Java	2	
	SQL Queries	2	
4	Project Work :IT Applications		5
5	Viva Voce		4
	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 a record of these in the practical 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**

   Students will be trying out SQL queries in MySQL throughout the year along with course coverage in theory. Student will be asked to write 5 queries based on one table 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:

   ● At least 2 applications using at least two productivity tools in each.

   ● At least 10 solutions of simple problems using IDE based Java (*refer to Appendices 'A' & 'B'*).

   ● At least 20 SQL queries on any database.

   ● At least one IT applications – project work.

4. **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 4 marks, 2 marks are allotted to test student's understanding of basic computer hardware and their functions.

domains – e-Governance, e-Business and e-Learning - with GUI front-end and corresponding database at the back-end.

5. 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.

Question Paper Design
Class-XI (2017-18) and XII (2017-18)

S.No.	Typology of Questions	Very Short Answer (VSA) (1 mark)	Short Answer-I (SA-I) (2 marks)	Short Answer-II (SA-II) (4 marks)	Long Answer (L.A) (6 marks)	Total Marks	% Weightage
1	Knowledge Based	4	3	2	-	18	25.7
2	Conceptual Understanding	4	5	1	-	18	25.7
3	Reasoning Based	4	-	2	1	18	25.7
4	Skill based	-	1	2	1	16	22.9
	Total marks	**12**	**9**	**7**	**2**	**70(30)**	**100**

1. No chapter wise weightage. Care to be taken to cover all the chapters.

2. The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and topology of questions same.

3. Questions may be case based requiring problem solving skills.

4. LA Questions may be case-based requiring problem–finding and problem –solving skills.

Appendix 'A'

Swing Control Methods & Properties

Class:	**Jbutton**
Swing Control:	**jButton**
Methods:	**getText(), setText()**
Properties:	Background, **Enabled,** Font, Foreground, **Text, Label**
Class:	**Jlabel**
Swing Control:	**jLabel**
Methods:	**getText(), setText()**
Properties:	Background, **Enabled,** Font, Foreground, **Text**
Class:	**JtextField**
Swing Control:	**jTextField**
Methods:	**getText(), isEditable(), isEnabled(), setText()**
Properties:	Background, **Editable, Enabled,** Font, Foreground, **Text**
Class:	**JRadioButton**
Swing Control:	**jRadioButton**
Methods:	**getText(), setText(), isSelected(), setSelected()**
Properties:	Background, **Button Group, Enabled,** Font, Foreground, **Label, Selected, Text**
Class:	**JcheckBox**
Swing Control:	**jCheckBox**
Methods:	**getText(), setText(), isSelected(), setSelected()**
Properties:	**Button Group, Font, Foreground, Label, Selected, Text**
Class:	**ButtonGroup**
Swing Control:	**jButtonGroup**
Methods:	
Properties:	**Add**
Class:	**JcomboBox**
Swing Control:	**jComboBox**
Methods:	**getSelectedItem(), getSelectedIndex(), setModel()**
Properties:	**Background, ButtonGroup, Editable, Enabled, Font, Foreground, Model, SelectedIndex, SelectedItem, Text**
Class:	**Jlist**
Swing Control:	**jList**
Methods:	**getSelectedValue()**
Properties:	**Background, Enabled, Font, Foreground, Model, SelectedIndex, SelectedItem, SelectionMode, Text**
Class:	**Jtable**
Swing Control:	**jTable**

Methods:	addRow(), getModel()
Properties:	model
Class:	JoptionPane
Swing Control:	
Methods:	showMessageDialog()
Properties:	
Class:	DefaultTableModel
Swing Control:	
Methods:	getRowCount(), removeRow(), addRow()
Properties:	

Commonly used Methods

Class	Methods
Integer	parseInt(), toDouble(), toString()
String	concat(), length(), substring(), toDouble(), toLowerCase(), toUpperCase(), trim()
Double	parseDouble(), toString(), toInt()
Math	pow(), round()

Database Connectivity Methods

Class	Methods
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.

Appendix 'B'

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 (+,-,*,/) and display the result in MessageDialog or TextBox using simple GUI application

4. To perform simple arithmetic operation (+,-,*,/) 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 of students in each class and section.

Sample Guidelines for Connectivity Problems

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 (using jTable) on the GUI form based on a criteria input by the user.

14. To 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.

Know More (beyond syllabus):

●   Teachers may also motivate students to search for topics of emerging ICT technologies such as Web Services, Cloud Computing, SDK on Android etc. for group discussions and presentations.

●   Students may be encouraged for collaborative programming and remote trouble shooting.

Suggested Textbooks:

●   Informatic Practices (Class XI) published by CBSE

●   Informatic Practices (Class XII) published by CBSE