

## 15. INFORMATICS PRACTICES (Code No. 065) (2016-17)

### 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 (2016-17)

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
	<b>Total</b>	<b>125</b>	<b>115</b>	<b>240</b>	<b>70</b>

### 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, 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, PC/Server, and mobile devices.

- (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 Structure- 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.

### 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:* 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, inserting new rows with null values and values of all the studied data types.
- *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), deleting column (s) and modifying column structure

### 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.

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

### CLASS XI (PRACTICAL) (2016-17)

S.No.	Description		Marks
1	Problem solving using Java		10
2	SQL queries		5
3	Practical Records: Application of Productivity Tools (WP, Spreadsheets, Presentation)	2	6
	Simple problems using Java	2	
	SQL Queries	2	
4	Project Work : IT Applications		5
5	Viva Voce		4
	<b>Total</b>		<b>30</b>

#### 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 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:

- 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 application - 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.

**COURSE DESIGN**  
Class XII (2016-17) (THEORY)

Unit	Topic	Period		Total periods
		Theory	Practical	
1	Networking and Open Standards	20	4	24
2	Programming	46	44	90
3	Relational Database Management System	50	40	90
4	IT Applications	10	26	36
<b>Total</b>		<b>126</b>	<b>114</b>	<b>240</b>

**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, Satellite Link;
- *Network Devices*: MODEM, 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, Remote access software such as Team Viewer;
- *Identifying computers and users over a network*: Basic concept of domain name, MAC (Media Access Control), and IP Address, domain name resolution
- *Network Security Concepts*: Cyber Law, Firewall, Cookies, Hackers and Crackers
- *Network security threats*: denial of service, intrusion problems, snooping, eavesdropping
- *Internet Applications*: SMS, Voice Mail, Electronic Mail, Chat, Video Conferencing
- *Wireless/Mobile Communication*: GSM, CDMA, WLL, 3G, 4G

**Open Source Concepts:**

- Open Source Software (OSS), common FOSS/FLOSS examples (GNU/Linux, Firefox, OpenOffice, Java, Netbeans, MySQL), common open standards (HTML, XML, ODF, TCP/IP)
- *Indian Language Computing*: character encoding, UNICODE, different types of fonts (open type vs true type, static vs dynamic), entering Indian Language Text - phonetic and key map based, Inscript.

**Unit 2: Programming**

**Review of Class XI;**

**Programming Fundamentals**

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

- Basic concept of class, object, inheritance and polymorphism.

- Commonly used libraries:
  - String class and methods: toString(), concat(), length(), toLowerCase(), toUpperCase(), trim(), substring()
  - Math class methods: pow(), round()
- Accessing MySQL database using 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, B, I, U, CENTER, COMMENT, IMG, ANCHOR(A), 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, ROLLBACK and Savepoint.
- *Grouping Records*: GROUP BY, Group functions - MAX(), MIN(), AVG(), SUM(), COUNT(); using COUNT(\*), DISTINCT clause with COUNT; Group Functions and Null Values.
- Creating a Table with PRIMARY KEY, FOREIGN KEY and NOT NULL constraints, Viewing Constraints, Viewing the Columns Associated with Constraints using DESC command.
- *Displaying Data From Multiple Tables*: Cartesian product, Union, Intersection and Equi-Join
- ALTER TABLE for
  - deleting column(s), modifying data type(s) of column(s),
  - adding a constraint, enabling constraints, dropping constraints.
- 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, environmental and Economic benefits.

In each of the above domains, identify at least two real-life problems, list the expected outputs and the input(s) required for the output, and describe the problem solving approach and develop relevant front-end interface and back-end database.