FACULTY OF SCIENCE

SYLLABI

FOR

INFORMATIONS TECHNOLOGY
(ELECTIVE)

FOR
B.A./B.Sc./B.COM.

1\textsuperscript{st} & 2\textsuperscript{nd} Semester
\&
2\textsuperscript{nd} & 3\textsuperscript{rd} Year

EXAMINATIONS 2014-2015

--:O:--
**PANJAB UNIVERSITY, CHANDIGARH.**

**Information Technology (Elective)**

**Scheme of Examination**

<table>
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<tr>
<th>Sr. No.</th>
<th>Paper</th>
<th>Name of Paper</th>
<th>Lectures per week</th>
<th>Ext.</th>
<th>Int.</th>
<th>Max. Marks</th>
<th>Exam. Hours</th>
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<tr>
<td>1</td>
<td>A</td>
<td>Computer Fundamentals and Operating System</td>
<td>6</td>
<td>65</td>
<td>10</td>
<td>75</td>
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<tr>
<td>2</td>
<td>C</td>
<td>Practical on Paper – A</td>
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<td>IV</td>
<td>Object Oriented Programming using C++</td>
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<td>55+5</td>
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<td>6</td>
<td>V</td>
<td>Computer Networks and Internet Programming</td>
<td>3</td>
<td>55+5</td>
<td>60</td>
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<td>7</td>
<td>VI</td>
<td>Practical on Paper-IV &amp; V</td>
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| 8       | On-the-job Training | 4 Weeks | 30 | - |

| 9       | VII   | Programming in Visual Basic and Oracle | 3 | 55+5 | 60 | 3 |
| 10      | VIII  | Linux Operating System | 3 | 55+5 | 60 | 3 |
| 11      | IX    | Project Report | 80 |

**Note:**

The evaluation to be done by the college teacher on the basis of performance/evaluation report obtained from the place of On-the-job training.

The evaluation will be done by internal/external examiner on the basis of Project Report submitted by the candidate and viva-voce examination.
FIRST SEMESTER

Paper – A : Computer Fundamentals and Operating System

Objective of Module: The objective of module is to familiarize the students with developments in information Technology and use of computer systems at operating system level and application level.

Note:

i. The Question Paper will consist of Four Sections.

ii. Examiner will set total of NINE questions comprising TWO questions from each Section and ONE compulsory question of short answer type covering whole syllabi.

iii. The students are required to attempt ONE question from each Section and the compulsory question.

iv. All questions carry equal marks unless specified.

SECTION - A

1. Basics of Computers and Number Systems

Block diagram of a computer, booting process, introduction to the concepts-bit, byte, word, hardware, operating system, system and application software, machine, assembly and high level languages, compilers, assemblers, loaders and linkers.

ASCII and EBCDIC codes, Binary, Octal, Decimal and hexadecimal number systems and their conversion, Integer and floating point representation, error detection techniques.

SECTION - B


Features of DOS, windows and Unix operating systems and their comparison.

Internal and External commands of DOS, File and directory management commands such as DIR, COPY, TYPE, DEL, DELTREE, UNDELETE, CHKDSK, FORMAT, XCOPY, SCANDISK, creating batch files using REM, ECHO, PAUSE, IF, GOTO, AUTOEXEC.BAT and CONFIG.SYS files.

Concepts of window, menu, icon, opening, closing and resizing windows, creating folder, Using Start, control panel, recycle bin and online help, using windows explorer to manage files and directories.

Overview of UNIX structure, general purpose UNIX commands such as date, echo, cal, bc, pwd, passwd; file and directory commands such as ls, mkdir, cp, mv, rm, process management commands such as ps, kill, nohup, communication commands such as news, mesg, wall.
SECTION - C

3. Input & Output devices
Various input devices such as keyboard, mouse, joystick; output devices such as monitor (CGA, EGA, VGA and SVGA), different types of printers and plotters.

Primary and secondary memory; Cache, extended and expanded memory.

Removable and non-removable secondary memory: tapes, disks, CDROM, DVD, comparison of these devices based on technology and speed.

Organization of data on disks: Tracks, sectors, cylinders, heads, access time, seek time and latency time.

Typical configuration of a Personal Computer, functional description of various modules, cards and peripherals used in a PC

SECTION - D

4. Computers and Communication
Single-user, multi-user, and client-server systems; distributed and Parallel processing systems; Hardware & Software components of computer networks, Network topologies for LAN & WAN, Various Internet services and their use

5. Installation and using Application Software and Data Management Tools.
Installing and understanding the features and applications of the following software: MS-Word, MS-Excel, MS-Power-Point, Virus detection, prevention and anti-virus packages.

References:

6. Curtin, N.D, : Information Technology

Paper – C : Practical on Paper - A

Total Periods (6 Periods/week): 60 Max Marks: 25 Exam Hours: 3
Note for the Paper setter: Paper will be set at the time of examination. Due weightage may be given to the practical note-book and assignments.
SECOND SEMESTER

Paper – B : Computer Programming using C

Total Periods (6 Periods/week): 60            Max Marks: 65            Exam Hours: 3

Objective: This course enables the students to familiarize themselves with problem solving on computers using programming language ‘C’.

Note:
   i. The Question Paper will consist of Four Sections.
   ii. Examiner will set total of NINE questions comprising TWO questions from each Section and ONE compulsory question of short answer type covering whole syllabi.
   iii. The students are required to attempt ONE question from each Section and the compulsory question.
   iv. All questions carry equal marks unless specified.

SECTION - A

1. Overview of Programming: Introduction to computer based problem solving: requirements of problem solving by the computer, Problem identification, Problem definition, Examples for problem solving, Problem solving strategies: Program Design and implementation issues: Programs and Algorithms, Top-down design and stepwise refinement (breaking a problem into sub-tasks, Data organization or Data Structures), Construction of loops-basic programming, establishing initial conditions, terminating conditions, Implementation (use of procedures for Modular design, choice of variable names, documentation of programs, program testing); programming Environment, Programming Language classification.

SECTION - B

2. C Language : History, Structure of a C program: Data types – (int, float, char, double, void), Data structures; Constants and variables, variable declaration (integer, float, character, logical variables, string variables), Constants; Operators and Expressions: Arithmetic operators, Relational Operators, logical operators, Expressions; Control constructs: if-else, for, while; Arrays: Array declaration, one and two dimensional arrays; Functions-Fundamentals: General form, function arguments, Return value, Basic I/O: Formatted input/ Output, Unformatted Input/Output; Program Design examples; Advanced features: Type modifiers and storage class specifiers for data types, Bit operators, ? Operator, & operator, * operator, Type casting. Type conversion; Advanced Programming Techniques: Control constructs: do-while, switch statements, break and continue, exit() function, goto and label; Scope Rules: Local and Global variables.

SECTION – C

3. Scope rule of functions; Functions: Parameter passing –call by value and call by reference, calling functions with Arrays, argc and argv; Recursion: Basic concepts, Design examples (Tower of Hanoi, Recursive quick sort); Dynamic Data structures in C: Pointers, the & and * operators, Pointer expression, Pointer assignments, Pointer arithmetic, Pointer comparison. The dynamic allocation functions – malloc and calloc.
Pointer Vs Arrays, Arrays of pointers, Pointers to Pointers, Initialising Pointers, Pointers to functions, function returning Pointer, Functions with variable number of Arguments.

SECTION - D

4. Structures: Basics of Structures, Declaring a structure, Referencing structure elements, Array of structures, Passing structures to functions, passing entire structure to functions, Structure Pointers, Declaring a structure pointer, Arrays and Structures within Structures; Unions: Declaration, Uses, Enumerated data types, typedef, Example algorithms: linked list: insertion, deletion and search; File Handling: The file Pointers, file accessing functions (fopen, fclose, putc, getc, fprintf); C preprocessor: # define, # include, #undef, #conditional compilation directives (#if, #else, #elif, #endif, #def and #undef); C Standard Library and Header files, Header files (stdlib.h), ctype.h, string.h, math.h, stlib.h, time.h) etc., Standard library functions, string functions, Mathematical functions, Date and time functions, Variable argument list functions, Utility functions, Character class test functions.

References:

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<tr>
<td>3.</td>
<td>Kernighan &amp; Ritchie</td>
<td>The C Programming Language PHI</td>
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<td>4.</td>
<td>Kenneth A.</td>
<td>C Problem Solving and Programming, PHI</td>
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Total Periods (6 Periods/week): 60 Max Marks: 25 Exam Hours: 3

Note for the Paper setter: Paper will be set at the time of examination. Due weightage may be given to the practical note-book
SECOND YEAR

Paper-IV: Object Oriented Programming using C++

Total Periods (3 Periods/week): 90 Max Marks: 55 Exam Hours: 3

Objective: The objective of the module is to familiarize the students with steps in problem solving on computers and create skill in programming using C++.

Note:
1. The Question Paper will consist of Four Sections.
2. Examiner will set total of NINE questions comprising TWO questions from each Section and ONE compulsory question of short answer type covering whole syllabi.
3. The students are required to attempt ONE question from each Section and the Compulsory question.
4. All questions carry equal marks unless specified.

SECTION - A

Structure of a C++ program:
Include files, Declaration of an object, main function, I/O streams.

SECTION - B
Class and Objects:
Class declaration: Data members, Member Functions, Private and Public members, data hiding and encapsulation, arrays within a class.

Class function definition: Member function definition inside the class declaration and outside the class declaration, scope resolution operator, Private and public member function, nesting of member functions.

Creating objects, accessing class data members, accessing member functions, arrays of objects, objects as function arguments: Pass by value, pass by reference, pointers to objects.

Constructors and destructors
Constructors: Declaration and definition, default constructors, parameterized constructors, copy constructors, destructors: Definition and use.

SECTION - C
Function overloading
Function overloading: declaration and definition.
Inheritance-Extending classes
Concept of inheritance, base class, derived class, defining derived classes, visibility modes, private, public, protected; Single inheritance: privately derived, publicly derived; making a protected member inheritable, access control to private and protected members by member functions of a derived class, multilevel inheritance, nesting of classes.

SECTION - D

Data Structures: Linked Lists, Queues, Stacks and Trees, Sorting algorithms.

References:

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<tbody>
<tr>
<td>1.</td>
<td>Stroustrup, Addison Wesley</td>
<td>The C++ Programming Language</td>
</tr>
<tr>
<td>2.</td>
<td>Lafore, Robert Galgotia, N.D, 1996.</td>
<td>OOP in Turbo C++</td>
</tr>
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<td>4.</td>
<td>Schildt, Herbert</td>
<td>Schildt’s advanced Win95 Prog. in C &amp; C++ / MH</td>
</tr>
</tbody>
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Paper-V: Computer Networks and Internet Programming

Total Periods (3 Periods/week): 90 Max Marks: 55 Exam Hours: 3

Objective: The objective of the module is to familiarize the students with fundamentals of computer Networks.

Note:

i. The Question Paper will consist of Four Sections.
ii. Examiner will set total of NINE questions comprising TWO questions from each Section and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Section and the Compulsory question.
iv. All questions carry equal marks unless specified.

SECTION – A

Computer Networks

Physical Layer: Transmission Media, Switching, ISDN and its service, Multiplexing, Modems.

Data Link Layer: Design issue, Error detection and correction codes, elementary data link protocols, static and dynamic channel allocation, Introduction to IEEE standards, sliding window protocol.
SECTION - B
Network Layer: Design issues, routing algorithms, shortest path routing, flooding, broadcast & Multicast routing congestion control and internet working.
Application Layer: Network security & privacy, data compression and cryptography.
Electronic mail, The WWW, Multimedia, Audio, Video, Remote login, file transfer.

SECTION - C
Internet Programming
Internet: Evolution of Internet, Future of Internet, Services provided on the Internet, Internet Access Methods.
Installing Netscape Communicator, Browsing internet using Netscape, Netscape Messenger
Front Page: Installing, Front Page Editor, Create a sample website, frames in Front Page, Forms, Database Pages.

Hypertext Markup Language: Introduction, Building Blocks of HTML, Lists, Links, Images in HTML

SECTION - D
Advanced HTML: Tables, Frames, Layers, Forms, Editors
Cascading Style Sheets: Introduction, CSS positioning
Fundamentals of Java Programming (10 lectures on Java)

References:

6. Liang, 2000 : An Introduction to Java Programming PHI.
11. Black, : Data Networks PHI
12. Nance, Bary : Introduction to Networking PHI

Paper-VI: Practical on Paper IV & V

Total Periods (6 Periods/week): 120  Max Marks: 50  Exam Hours: 4
Note for the Paper setter: Paper will be set at the time of examination. Due weightage may be given to the practical note-book and assignments.
THIRD YEAR

**Paper-VII: Programming in Visual Basic and Oracle**

Total Periods (3 Periods/week): 120  Max Marks: 55  Exam Hours: 3

**Objective:** The objective of module is to create skills in RDBMS and visual Basic. The students should be able to independently develop database projects.

**Note:**
1. The Question Paper will consist of Four Sections.
2. Examiner will set total of **NINE** questions comprising **TWO** questions from each Section and **ONE** compulsory question of short answer type covering whole syllabi.
3. The students are required to attempt **ONE** question from each Section and the Compulsory question.
4. All questions carry equal marks unless specified.

**SECTION - A**

**Visual Basic**
Visual Basic IDE: An Overview, the new project dialog, IDE elements and features, starting a new project or opening an existing one, saving your projects, setting environment, editor, and general options, adding different modules to a project, the edit menu; the toolbox: Adding control to forms, adding components to the toolbox, the properties window, the project explorer the form layout the format menu, making effective use of the code window; the object browser, the menu editor, debugging tools, compiling executables.

Event-Driven Programming: Working with Visual Basic Source Files, using the MSGBOX Function when an Event is Fired, Adding code to a form Click Event; Properties and Methods in Visual Basic: Properties, Methods, Event Firing order: Form Startup Events, From User Response Events, Form Shutdown Events; The MSG-Box Function and Query Unload, Adding Code to Form and Control events, Basic Concepts to Object-oriented Programming, Encapsulating VB Dialog; Understanding Class Modules: Properties, Methods, Using class Properties and Methods, Creating, Firing and Handling.

**SECTION - B**

Visual Basic Language overview: VB code lines and comments, Identifiers, constants and Variables, using option explicit, numbers, operators, control loops and conditional statements, Modules, subroutines and Functions, passing Arguments, programmer-Defined Structures, Arrays; Speaking the Language of Objects: Using Activex controls, using Activex components.

Handling Errors: Kinds of errors, Syntax and compile time errors, Some guidelines for testing programs, On error, Resume and Resume next; The Err Object: The Raise Method, Common Trappable errors, The last DLL Error property; Raising an Error: Raising a user-defined Error; Debugging Tools, Using Assertions.
SECTION – C

Oracle
Introduction to RDBMS: Approaches to Data Management, Database management - An Evolutionary Phenomenon, Introduction to DBMS, The 12 Rules (Codd’s Rule) for an RDBMS, Relational Database Management System (RDBMS), Oracle Server and Oracle Database, Oracle Products.

Introduction to SQL Plus:
Introduction to SQL, Oracle Data Types, Starting SQL Plus, Querying database tables, Conditional retrieval of rows, Working with Null Values, Matching a pattern from a table, ordering the result of a Query Aggregate Functions, Grouping the Result of a Query, ROLLUP Operation: Getting Sub Totals, CUBE Operation: Getting Cross Tabs, Command Summary of SQL Plus Editor.

Querying Multiple Tables:

Functions:
Functions, Column Functions: Arithmetic Functions, Character Functions, Date Functions, General Functions, Group Functions.

SECTION - D

Data Manipulation and Control-I
Data Definition Language (DLL), Creating Tables, Creating a Table with data from Another table, Inserting Values into a Table, Updating Column(s) of a Table, Deleting Row(s) From a Table, Dropping a Column, Introduction to Views, Manipulating the Base table(s) through views, Rules of DML Statements on Join Views, Dropping a View, Inline Views, Materialized Views.

Data Manipulation and Control-II
Database Security and Privileges, Grant Command, Revoke Command, Application Privileges Management, Enhancing Performance, Sequences, Maintaining Database Objects, COMMIT and ROLLBACK.

PL/SQL-I

PL/SQL-II
Cursor Management in PL /SQL, Cursor Manipulation, Implicit cursor Attributes, Exception Handling in PL/SQL, Predefined Exceptions, User Defined Exception.
References:

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<th></th>
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<th>Title and Publisher</th>
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<tr>
<td>1</td>
<td>Harold Davis</td>
<td>Visual Basic Secrets</td>
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<td>2</td>
<td>Natham Gurewich and Ori Gurewich</td>
<td>Visual Basic in 21 days Fourth Edition</td>
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<td>3</td>
<td>Brierley, E.</td>
<td>Visual Basic 6 How To / Techmedia</td>
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<td>5</td>
<td>Evangelos, Petroutsor:</td>
<td>Mastering VB 6.0, BPB</td>
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<td>6</td>
<td>Jerke, N.</td>
<td>The Complete Reference VB 6.0, TMH</td>
</tr>
<tr>
<td>7</td>
<td>Cornel, Gary</td>
<td>Visual Basic from the Ground up, TMH</td>
</tr>
<tr>
<td>8</td>
<td>Perry, James T. &amp; Lateer, Joseph G.</td>
<td>Understanding Oracle, BPB</td>
</tr>
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Paper-VIII: Linux Operating System

Total Periods (3 Periods/week): 120    Max Marks: 55    Exam Hours: 3

Objective: The objective of the module is to familiarize the students with Linux Operating System.

Note:

i. The Question Paper will consist of Four Sections.
ii. Examiner will set total of NINE questions comprising TWO questions from each Section and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Section and the Compulsory question.
iv. All questions carry equal marks unless specified.

SECTION - A

Introduction to Operating Systems, its need and services, Simple Batch systems, Multi-programmed batched systems, Time sharing systems, Parallel systems, distributed systems and real time systems.

Introduction to Linux: What is Linux, Linux's History, Minimum System Requirements; Installing Linux : Working with Linux, Floppy-less Installation, Boot and Root Disks, Choosing Text or Graphics Installation, Setting up your Hard Drive, Formatting the Partitions, Setting up the Ethernet, Configuration X, Selecting packages to Install, Using LILO; Partitioning the Hard Disk : Linux Swap Space Partitions, Linux's fdisk, Enabling the Swap Space for Installation, Creating the Linux File-system partition, Using LILO.

Using Linux: Starting and Stopping your Linux System, Linux Shutdown Commands, Login, Passwords, Creating a New Login, Logging Out; Trying out your new Login : Linux Error Messages, Search Paths; The who Command, Commands and Programs.
**SECTION - B**

**Basic Linux Commands:** How Linux Commands Work, Command Options, Other Parameters, Input and Output Redirection, National conventions used to Describe Linux commands, Online help available in Linux, The Linux Man pages, Finding keywords in Man pages, The bash shell help facility; Wildcards : * and ?, Environment Variables, Process and How to Terminate them, The process status Commands : ps, The process termination command : kill, Becoming someone else, the su command, the grep command.

**Using the File System:** Files Overview, Common types of files, filenames, Directories an Overview, Parent directories and sub-directories, The root directory, How directories are named, The home directory; Navigating the Linux file System : pwd command, Absolute and relative filenames; cd command, Creating and Deleting files : Cat, Creating Directories, Moving and Copying files, Moving and Copying with Wildcards, Moving Directories, Removing files and directories, Fear of Compression: The Zipless file, Important directories in the Linux file System : /, /home, /bin, /usr, /usr/bin, /usr/spool, /dev, /usr/bin, /sbin, /etc.


**SECTION – C**

**Linux - tcsh:** An Introduction to tcsh, Command completion, Wildcards, Command History, Aliases, Input and Output Redirection, Pipelines, Prompts, Job Control; Key Bindings, Correcting Spelling Errors, Pre-commands, Change directory Commands, Monitoring Logins and Logouts, Customizing tcsh, tcsh Command Summary, tcsh variables.

**Shell Programming:** Creating and Running Shell Programs, Using variables : Assigning a value to a variable, Accessing the value of a variable, Positional Parameters and other Built-In Shell Variables; The Importance of Quotation Marks : The test Command, The tcsh Equivalent of the test command, Conditional Statements : if Statement , case Statement; Iteration Statements : for Statement, while Statement, until Statement, shift Command, select Statement, repeat Statement, Functions.

**Editing and Typesetting:** Text Editors vi, The vi Editor, Starting vi, vi modes, Inserting Text, Quitting vi, Moving the Cursor, Deleting Text, Copying and Moving Text, Searching and Replacing Text, Setting Preferences.

**SECTION - D**

**Linux for System Administrators:** System Administration Basics, The root Account, Starting and Stopping the System, Booting from a Floppy, Using LILO to Boot, Shutting Down Linux; Mounting File Systems : Mounting a Floppy, Creating a New file System, Un-mounting file Systems, Checking file Systems, Using a file as Swap Space;
Compressing files with gzip and compress: Using tar, Backups, Setting up your System: Setting the System Name, Using a Maintenance Disk, Forgetting the root Password, Setting the Login Message.

**Networking & Network Services:** What is TCP/IP? Hardware Requirements, Configuring Linux Files, Setting up the Dummy Interface, Configuration Files, Testing and Troubleshooting, The netstat Command, ping, Mail, News, NFS, NIS, www, FTP, DNS.

**References:**

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<td>3</td>
<td>Norton, P., 2000</td>
<td>Complete guide to LINUX, Techmedia. N.D.: Techmedia,</td>
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**Paper-IX: Project Report**

Max Marks: 80

The evaluation will be done on the basis of Project Report submitted by the candidate and viva-voce examination.

Development of an information system during 3rd year course.

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