

## 5.1 COMPUTER NETWORKS

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### RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder in computer engineering should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

### DETAILED CONTENTS

1. Networks Basics (06 hrs)
  - Concept of network
  - Models of network computing
  - Networking models
  - Peer-to-peer Network
  - Server Client Network
  - Network Services
  - Concept of switching
  - Switching Techniques
  
2. OSI Model (12 hrs)
  - OSI Reference Model
  - Function of various layers in OSI Reference Model
  
3. Introduction to TCP/IP (12 hrs)
  - Concept of physical and logical addressing
  - IPv4 addressers- Address space, Notations, Classful Addressing, Classless Addressing, Network Address Translation.
  - Different classes of IP addressing, special IP address
  - Sub netting and super netting
  - Loop back concept
  - IPv4 and IPv6 packet Format
  
4. Network Architecture (12 hrs)
  - Ethernet Specification and Standardization:  
10 Mbps (Traditional Ethernet), 10 Mbps (Fast Ethernet) and 1000 Mbps (Gigabit Ethernet), Introduction to Media Connectivity (Leased lines, ISDN, PSTN, RF, DSL, VSAT, Optical and IPLC)
  
5. Connectivity devices (08 hrs)
  - Network connectivity Devices

- NICs
  - Hubs, bridges
  - Repeaters, switches
  - Multiplexers
  - Modems
  - Routers
  - Gateways
6. Network Trouble Shooting Techniques (08 hrs)
- Trouble Shooting process
  - Trouble Shooting Tools: PING,IPCONFIG, IFCONFIG, NETSTAT, TRACEROOT, Wiresharp/ Dsniffer/ Pcop
7. IEEE 802.11- Architecture, Bluetooth- Architecture (06 hrs)

### **LIST OF PRACTICALS**

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11, BNC and SCST
3. Recognition of network devices (Switches, Hub, Routers of access points for Wi-Fi)
4. Making of cross cable and straight cable
5. Install and configure a network interface card in a workstation.
6. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
7. Managing user accounts in windows and LINUX
8. Study and Demonstration of sub netting of IP address
9. Use of Netstat and its options.
10. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
11. Installation of Network Operating System(NOS)
12. Visit to nearby industry for latest networking techniques

### **INSTRUCTIONAL STRATEGY**

This subject deals with both theory and practicals. The students should be made to practically establish LAN with various hardware and software and their integration.

## RECOMMENDED BOOKS

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi
2. Data Communications and Networking by Forouzan, (Edition 2<sup>nd</sup> and 4<sup>th</sup>), Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Data and Computer Communication by William Stallings, Pearson Education, New Delhi
4. Networking Essentials – BPB Publications New Delhi
5. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.
6. Linux – The complete Reference by Richard Peterson, Tata McGraw Hill Education Pvt Ltd, New Delhi.
7. Linux – Install and Configuration Black Book by Dee Annleblanc and Issac Yates, IDG Books India Private Limited, Delhi.
8. Unleashed Linux by TechMedia Publishers, New Delhi
9. Computer Network by J.S. Katre, Tech-Max Publication, Pune

## SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Networks Basics	6	10
2	OSI Model	12	20
3	Introduction to TCP/IP	12	20
4	Network Architecture	12	20
6	Connectivity Devices	8	12
7	Network Troubleshooting Techniques	8	12
8	Wireless Networking	6	8
<b>Total</b>		<b>64</b>	<b>100</b>

## 5.2 SOFTWARE ENGINEERING

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### RATIONALE

This subject will enable the diploma students to have awareness about software engineering, various matrices, planning about software, cost estimation, software design etc.

### DETAILED CONTENTS

1. Introduction to Software Engineering (6 hrs)  
Introduction, Programmes v/s Software Products  
Emergence of Software Engineering- Early Computer Programming, High- level Language Programming, Control flow based Design, Data Structure Oriented Design, Object Oriented Design
2. Software Life Cycle Models (8 hrs)  
Requirement of Life Cycle Model, Classic Waterfull Model, Prototyping Model, Evolutionary Model, Spiral Model.  
Comparison of different Life Cycle Models
3. Software Planning (10 hrs)  
Responsibilities of Software Project Manager  
- Metrics for Project Size Estimation- LOC(Lines of Code), Function Point Metric  
- Project estimation Techniques- Using COCOMO Model, Halstead's Software Science
4. Requirement Analysis and Specification (6 hrs)  
Requirement gathering and Analysis, Software Requirement Specifications(SRS), Formal Specification Technique, Characteristics of good SRS
5. Software Design and Implementation (6 hrs)  
Characteristics and features of good Software Design Cohesion and Cupling, Software design Approaches- Function Oriented Design, Object Oriented Design, Structured Coding Techniques, Coding Styles, documentation
6. Software Testing (6 hrs)  
Concept of Testing, Verification v/s Validations, Unit Testing, BlackBox Testing, White Box Testing, Integration testing, System testing
7. Software Quality and Maintenance (6 hrs)  
Introduction to Capability Maturity Model, ISO9000 and Six Sigma, Configuration Management

## RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi
2. An Integrated Approach to Software Engineering by Pankaj Jalote, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002
3. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi
4. Software Engineering by KK Aggarwal and Yogesh Singh
5. Software Engineering – A Practitioner’s Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	6	12
2.	8	20
3.	10	20
4.	6	12
5.	6	12
6.	6	12
7.	6	12
<b>Total</b>	<b>48</b>	<b>100</b>

### 5.3 EMPLOYABILITY SKILLS – I

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#### RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market and survive in cut throat competition among professionals.

#### DETAILED CONTENTS

1. Writing skills (08 hrs)
  - i) Official and business correspondence
  - ii) Job application - covering letter and resume
  - iii) Report writing - key features and kinds
  
2. Oral Communication Skills (20 hrs)
  - i) Giving advice
  - ii) Making comparisons
  - iii) Agreeing and disagreeing
  - iv) Taking turns in conversation
  - v) Fixing and cancelling appointments
  
3. Generic Skills (04 hrs)
  - i) Stress management
  - ii) Time management
  - iii) Negotiations and conflict resolution
  - iv) Team work and leadership qualities

## 5.4 ENVIRONMENTAL EDUCATION

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### RATIONALE

Education about environment protection is a must for all the citizens. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures. He should also be aware of environmental laws related to the control of pollution.

### DETAILED CONTENTS

1. Definition, Scope and Importance of Environmental Education (02 hrs)
2. Basics of ecology, biodiversity, eco system and sustainable development (03 hrs)
3. Sources of pollution - natural and manmade, causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear) and their units of measurement (12 hrs)
4. Solid waste management – Causes, effects and control measures of urban and industrial waste (06 hrs)
5. Mining and deforestation – Causes, effects and control measures (04 hrs)
6. Environmental Legislation - Water (prevention and control of pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board, Environmental Impact Assessment (EIA) (10 hrs)
7. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy) (04 hrs)
8. Current Issues in Environmental Pollution – Global Warming, Green House Effect, Depletion of Ozone Layer, Recycling of Material, Environmental Ethics, Rain Water Harvesting, Maintenance of Groundwater, Acid Rain, Carbon Credits. (07 hrs)

## INSTRUCTIONAL STRATEGY

The contents will be covered through lecture cum discussion sessions. In addition, in order to have more appreciation of need for protection of environment, it is suggested that different activities pertaining to Environmental Education like video films, seminars, environmental awareness camps and expert lectures may also be organized.

## RECOMMENDED BOOKS

1. Environmental Engineering and Management by Suresh K Dhameja; SK Kataria and Sons, New Delhi.
2. Environmental Science by Dr. Suresh K Dhameja; SK Kataria and Sons, New Delhi.
3. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
4. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
5. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
7. Environmental Studies by Erach Bharucha; UGC University Press.

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted for Lectures (Periods)</b>	<b>Marks Allotted (%)</b>
1	02	04
2	03	06
3	12	24
4	06	12
5	04	10
6	10	20
7	04	10
8	07	14
<b>Total</b>	<b>48</b>	<b>100</b>

## 5.5 RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)

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### RATIONALE

Database and database systems have become an essential component of everyday life in modern society. This course will acquaint the students with the knowledge of fundamental concepts of DBMS and its application in different areas, storage, manipulation and retrieval of data using query languages. Oracle/My SQL/SQL Server can be used as package to explain concepts.

### DETAILED CONTENTS

1. Relational Model: (08 hrs)  
Relational Model Concepts: Domain, Attributes, Tuples and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Relational databases and relational database schemes, Entity integrity, referential integrity and foreign key
2. Functional dependencies and Normalization (04 hrs)  
Concept of Normalization, Need of Normalization, Non-loss decomposition and functional dependencies, Trivial and Non Trivial dependencies, Closure of a set of dependencies and attributes.  
Normalization: First, Second and Third normal forms, Boyce/Codd normal form Multi Valued dependency 5 NF.
3. Relational Calculus and Algebra (4 hrs)  
Operations, Tuple Calculus, Domain Calculus, Example of Query language based on tuple and domain
4. SQL Components and Data Definition Language (6 hrs)  
SQL's basic objects, data types, aggregate functions, scalar functions, null values, creating database objects, modifying database objects, removing database objects.

5. Queries and Data Manipulation Language (6 hrs)  
Insert statement, Update statement, Delete statement, Select statement, queries and sub-queries, different clauses of select statement, join operator, correlated sub-queries, derived tables.
6. Stored procedures and User defined functions (6 hrs)  
Procedural extensions, IF statement, WHILE statement, local variables, try and catch statements, stored procedures, user defined functions, system catalog.
7. Indexes, Views and Security (6 hrs)  
Guidelines for creating and using indexes, creating and using views, advantages and disadvantages of views, security system of database engine, database security, roles, authorization: grant, deny, revoke statements.
9. Triggers (4 hrs)  
Introduction to triggers, creating and using triggers, database level triggers, server level triggers

#### **LIST OF PRACTICALS**

1. Installing and Uninstalling SQL Server.
2. Creating, modifying and removing database objects.
3. Working with queries involving joins, correlation, sub-queries, set operators.
4. Creating and using stored procedures and user defined functions.
5. Creating indexes.
6. Creating and using views.
7. Using and understanding grant, revoke and deny statements.
8. Creating and using database triggers.

#### **RECOMMENDED BOOKS**

1. Fundamentals of Database Systems by Ramez Elmasri, Shamkant Navathe; Pearson Education.
2. Data Base Management System By Ivan Byross
3. A Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan; Tata McGraw Hill.

### SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	Relational Model	08	18
2	Functional Dependencies and Normalization	08	18
3	Relational Algebra and Calculus	04	08
4	SQL Components and Data Definition Language	06	12
5	Queries and Data Manipulation Language	06	12
6	Stored procedures and User defined functions	06	12
7	Indexes, Views and Security	06	12
8	Triggers	04	08
	<b>Total</b>	<b>48</b>	<b>100</b>

## 5.6.1 VISUAL BASIC

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### RATIONALE

VB is a programming language, which enables a programmer to write programs and develop application packages to produce solution to live problems. After undergoing this course, the students will be able to understand the principles of Active-X objects and write programs in VB.

### DETAILED CONTENTS

1. Introduction to Visual Basic (15 Hrs)  
Features and applications of VB – concept of integrated development environment (IDE)  
– project application like standard Exe
2. VB Structure (4 Hrs)  
Variable declaration types – user defined data types – scope and life of a variable – arrays  
– constructors – control flow statements – procedures and functions.
3. Designing the User Interface (6 Hrs)  
Design aspects of VB forms – Elements of user Interface – properties of controls –  
textbox, label, command button, check box, list box, picture, image shape timer –  
designing forms and displaying messages using above controls – control arrays.
4. Menus and Common Dialogue Control (6 Hrs)  
Creating menus at design time using menu design window – control menus and runtime –  
create shortest keys for pop up menus – common dialogue control.
5. Display date, time, string type conversion and Printing Information (6 Hrs)  
Data reports and environments – display tabular data in report form– fundamentals of  
printing – printing with print form method.
6. Data Base Programming (6 Hrs)  
Connecting with database, using DAO, RDO and ADO
7. Working with inbuilt Active X, Windows common control, creating own Active X  
through Active X control, Active X EXE, difference between EXE and DLL (5 hrs)

## **LIST OF PRACTICALS**

- 1) Exercise on opening projects like standard Exe, Active-X EXE and Active-X control
- 2) Exercise on all the menus of opening window of VB
- 3) Exercise on all basic controls
- 4) Exercise on design form like calculators, traffic lights
- 5) Exercise on small application using appropriate commands
- 6) Exercise on menus
- 7) Writing programs using arrays
- 8) Exercise on creating reports
- 9) Exercise on Data base connectivity
- 10) Exercise on creating own active X, component

## **INSTRUCTIONAL STRATEGY**

This subject deals with the programming concept of VB and the subject is having both theory and practical. While imparting instructions to the students, the teacher should stress on the usage of various built in Active-X Controls, DLL files so that with the help of which the students can develop application packages of their own

## **RECOMMENDED BOOKS**

1. Mastering VB, by Evangelous Petroustos BPB Publications, New Delhi
2. Teach Yourself VB by Techmedia Publications, New Delhi
3. Microsoft VB Manual by MS Press
4. Visual Basic & .Net by Null Dale, Michael Mc Millan, Chip Weems, Mark Headington, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002

### SUGGESTED DISTRIBUTION OF MARKS

<b>Sr No.</b>	<b>Time Allotted (in hrs.)</b>	<b>Marks Allotted (in %)</b>
1.	15	30
2.	4	8
3.	6	14
4.	6	14
5.	6	12
6.	6	12
7.	5	10
<b>Total</b>	<b>48</b>	<b>100</b>

## 5.6.2 PHP

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**Rationale:** This course is aimed at providing hands-on programming experience and to equip students with concepts and skills to develop a database backed dynamic and feature-rich website. The course covers the use of programming with PHP and the concepts of database with MySQL.

### DETAILED CONTENTS

Introduction to PHP: How PHP Works , The php.ini File, Basic PHP Syntax, PHP Tags, PHP Statements and Whitespace, Variable Types, Variable Names (Identifiers), Type Strength, Variable Scope, Constants, Variable-Testing and Manipulation Functions ,

Operators : Strings, arrays, comments,

Methods and Functions: Built in functions, User-defined functions, Function arguments, Returning values, Variable functions, Anonymous functions

Control statements: Conditional Processing : If Conditions , Loops : while, do...while, for, break and continue

PHP forms, Login Security Authentication (User logins), Authorization (Permissions), Encryption, Session Cookies

PHP Mail, File Handling, File Uploading,

Introduction to MySQL, Database design and Development using MySql, PHP Connectivity with MySQL .

### LIST OF PRACTICALS

1. Design PHP based web pages using correct PHP, CSS, and XHTML syntax, structure.
2. Create Web forms and pages that properly use HTTP GET and POST protocol as appropriate.
3. Design SQL language within MySQL and PHP to access and manipulate databases.
4. Install and configure both PHP and MySQL.
5. Create PHP code that utilizes the commonly used API library functions built in to PHP.
6. Design and create a complete web site that demonstrates good PHP/MySQL client/server design.

### RECOMMENDED BOOKS

1. Sams Teach Yourself PHP, MySQL, and Apache All in One" by Julie C. Meloni, Publisher: SAMS ,ISBN 0-672-32976-X

## 5.7 TROUBLESHOOTING OF COMPUTER SYSTEM

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### RATIONALE

This subject gives the knowledge and competency to diagnose the faults for trouble shooting for systematic repair and maintenance of computers and computer peripherals.

### DETAILED CONTENTS

#### 1. Repair servicing and maintenance concepts

Introduction to servicing and maintenance concepts. Meantime between failure(MTBF). Meantime to repair and maintenance policy, potential problems. Concept of preventive maintenance and corrective maintenance. Factors responsible for preventive maintenance, scheduling of preventive maintenance. Comparison of Preventive maintenance and corrective maintenance. Concepts of shielding, grounding. Power supply requirements in consideration of computer and its peripherals.

#### 2. Pre-Installation planning, Installation practise: Unpacking and checking, Removing a motherboard, Removing and replacing daughter boards. Routine checks, PC Assembling. Standard CMOS setup, Adding HDD to a system. Preparing HDD for use: Low level formatting, partitioning, high level formatting. Using system tools: Scandisk, defragmentation, check disk. Backup: Using backup utility, system restoring. Creating drive image: GHOST.

#### 3. Troubleshooting

Introduction, computer faults, nature of faults: Solid and Intermittent. Types of faults: Hardware and software. Reliability problems(Dry solder, loose contact, track break, etc)

Diagnostic programs and tools: Nodal Testers and System Testers. Introduction to nodal tools like Logic probe, logic pulser, current tracer, Oscilloscope, Digital Multimeter. Introduction to system testers like function tester, signature analyzer, logic analyser. Introduction to service manuals.

Fault elimination process, Systematic Troubleshooting: Symptoms observation, Symptom analysis, Fault diagnosis, fault rectification. Troubleshooting levels: POST messages, running diagnostics, probing with tools, using emulator.

Troubleshooting techniques: Functional area approach, split half method, circuit tracing techniques. Fault finding in divergent, convergent and feedback path circuits.

4. Troubleshooting of computers and peripherals  
Using Device manager, using task manager, dealing with error messages.  
problems and diagnosis of parts of computers : Motherboard, Floppy disk drive, Hard disk drives, CD ROM, DVD, Printers(Dot Matrix, Inkjet and laser), Modems, Monitors, SMPS, Serial ports.

## **REFERENCE BOOKS**

1. IBM PC and Clones by B Govind Rajalu, Mc Graw Hill
2. Electronic Test Equipment by Rs Khandpur
3. Upgrading and Maintenance Guide of PC by Mark Minansi

## **INSTRUCTIONAL STRATEGY**

The topic is very important as far as the job opportunity for the student of Computer Engineering is concerned. The teacher must greatly emphasise on detailed explanation of the topic for which he can make use of the peripheral device physically. All practical aspects specified must be handled by the students independently.