

## 5.1 COMPUTER ORGANIZATION AND ARCHITECTURE

L	T	P	Cr
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### RATIONALE

The subject provides the students with the knowledge of detailed organization of currently available personal computers in order to understand their functioning and maintenance. The students will also get familiar with different types of mother boards, architecture and bus standards. The single user system based on 486, Pentium MMX, Pentium-II, Pentium-III and Pentium-IV will get emphasis.

### DETAILED CONTENTS

1. Review (4 hrs)  
Salient features and block diagram of 486, Pentium MMX and Pentium-II, Pentium-III and Pentium-IV
2. Hardware Organization of PC (10 hrs)  
The motherboard of PC; Pentium, CPU, memory organization, keyboard interfacing, inter-facing of audio speakers, serial and parallel ports
3. Bus Standards and Architectures (6 hrs)  
ISA, EISA, VESA and PCI
4. Interface Standards (6 hrs)  
RS232, IDE, EIDE, SCSI-II, Fast and wide SCSI, IEEE 488, USB Firewire
5. The Basic Input/Output System (6 hrs)  
What is BIOS? Function of BIOS, software interrupts, testing and initialization, configuring the system
6. Input-Output Organisation (8 hrs)  
Input-output interface, I/O bus and interface for module, I/ O vs memory bus. Isolated Vs memory mapped, IP modes of data transfer, first in first out buffer, priority interrupt, daisy chaining priority, parallel priority interrupt priority encoder, interrupt cycle, direct memory access DMA controller, DMA transfer
7. Memory Organisation (8 hrs)  
Memory hierarchy; main memory, memory address, map, RAM and ROM chips, memory connection to CPU, auxiliary memory, associative memory, read and write operation, cache memory, associative mapping, virtual memory, memory management hardware memory segmentation.

## INSTRUCTIONAL STRATEGY

Since this subject is theoretical one, the practical aspects should be taught along with the theory instruction. The students be given quiz tests and asked to give seminars on small topics. List of practicals has been given only as guide lines not for examination. There is sufficient time in this subject students may be taken to laboratory for demonstration.

## RECOMMENDED BOOKS

1. Computer Architecture by Rafiquzzaman, M; Prentice Hall of India, New Delhi.
2. Fairhead – 80386/80486 BPB Publication, New Delhi
3. Hardware and Software of Personal Computers by Bose, SK; Willey Eastern Ltd., New Delhi
4. Structured Computer Organisation by Tanenbaum, Andrew S.; Prentice Hall of India, New Delhi.
5. Upgrading and Preparing PCs by Scott Muller, Techmedia Publications
6. Computer Organization and Architecture by Linda Labur, Narosa Publishing House Pvt. Ltd., Darya Ganj, New Delhi.
7. Computer system Architecture by Morris Mano

## SUGGESTED DISTRIBUTION OF MARKS

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

## 5.2 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

**L T P Cr**  
**4 - - 4**

### RATIONALE

Entrepreneurship Development and Management is one of the core competencies of technical human resource. Creating awareness regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects can be helpful in motivating technical/vocational stream students to start their own small scale business/enterprise. Since diploma technicians are expected to take-up middle level managerial positions, their exposure to basic management principles is very essential. Based on the broad competencies listed above, following detailed contents have been finalized to develop the appropriate competencies.

### DETAILED CONTENTS

- |     |  |          |
|-----|--|----------|
| (1) | Entrepreneurship   | (10 hrs) |
|     | 1.1 Concept/Meaning and its need   |          |
|     | 1.2 Competencies/qualities of an entrepreneur  |          |
|     | 1.3 Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institutes (SISIs), Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State and national level |          |
| (2) | Market Survey and Opportunity Identification (Business Planning)   | (10 hrs) |
|     | 2.1 How to start a small scale industry  |          |
|     | 2.2 Procedures for registration of small scale industry  |          |
|     | 2.3 List of items reserved for exclusive manufacture in small scale industry   |          |
|     | 2.4 Assessment of demand and supply in potential areas of growth   |          |
|     | 2.5 Understanding business opportunity   |          |
|     | 2.6 Considerations in product selection  |          |
|     | 2.7 Data collection for setting up small ventures  |          |
| (3) | Project Report Preparation   | (08 hrs) |
|     | 3.1 Preliminary Project Report   |          |
|     | 3.2 Techno-Economic feasibility report   |          |
|     | 3.3 Project Viability Report   |          |

- (4) Managerial Aspects of Small Business (10 hrs)
- 4.1 Principles of Management, Definitions, functions of management viz planning, organization, coordination and control
  - 4.2 Structure of an industrial organization.
  - 4.3 Basic principles of financial management
  - 4.4 Marketing Techniques
  - 4.5 Personnel Management, staff development and training strategies
  - 4.6 Importance and techniques of communication in business
- (5) Legal Aspects of Small Business (10 hrs)
- 5.1 Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules, provident fund
  - 5.2 Elementary knowledge of Factory Act, 1948 and Payment of Wages Act 1936, Workmen Compensation Act, Industrial Dispute act 1947, Employees State Insurance Act 1978
- (6) Environmental Considerations (04 hrs)
- 6.1 Concept of ecology and environment
  - 6.2 Factors contributing to Air, Water, Noise pollution
  - 6.3 Air, water and noise pollution standards and control
  - 6.4 Norms and standards of State pollution Board
  - 6.5 Disaster Management – basic idea
- (7) Miscellaneous (12 hrs)
- 7.1 Human resource development in an organization
  - 7.2 Motivation – Incentives, Rewards, Job Satisfaction
  - 7.3 Leadership- types, qualities, functions and factors of effective leadership
  - 7.4 Labor Welfare schemes including wage payment- types, system of wage payment and incentives
  - 7.5 Workers participation in management, case studies in effective Management.
  - 7.6 Accident and Safety: Classification, precaution and treatment after accident, safety practices promotion, personal protection equipment (PPFs) for safety at work places.
  - 7.7 Introduction to Total quality Management (TQM) and steps to achieve this .
  - 7.8 Intellectual Property Rights (IPR): Concept, definition, infringements and remedies related to patents, copy rights, trademarks, designs. Introduction to registering procedure

## INSTRUCTIONAL STRATEGY

The aim of this subject is to develop conceptual understanding by giving inputs and exposure about starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also.

## RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
3. Environmental Engineering and Management by Suresh K Dhamija, SK Kataria and Sons, New Delhi
4. Environmental and Pollution Awareness by Sharma BR, Satya Prakashan , New Delhi
5. Thakur Kailash, Environmental Protection Law and policy in India: Deep and Deep Publications, New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Industrial management by N. Mohan, and AP Verma, SK Kataria and Sons, Nai Sarak, Delhi-110006
9. Total Quality Management by Dr DD Sharma, Sultan Chand and Sons, New Delhi.
10. Principles of Management by Philip Kotler TEE Publication
11. Intellectual Property Rights and the Law by Dr. GB Reddy.

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	10	10
2.	10	20
3.	08	10
4.	10	15
5.	10	15
6.	04	10
7.	12	20
<b>Total</b>	<b>64</b>	<b>100</b>

**ELECTIVE-I**  
**5.3(a) NETWORK OPERATING SYSTEM**

L	T	P	Cr
3	-	6	6

**RATIONALE**

This course will enable the students to;

- i) Install and manage Linux server
- ii) Install and manage Windows server
- iii) Install and manage linux network servers

The students will be able to create use and give the different access and authority compatibility of different software with Linux and Windows NT

**DETAILED CONTENTS**

*Linux Operating System*

1. System Administration (8 hrs)  
Linux server feature, comparison with other server, hardware requirements, system management, managing users; installing and managing devices
2. Samba server and other servers available in linux, managing administration tools (6 hrs)
3. Network Server (10 hrs)  
Telnet Server, FTP Server, Named (DNS) Server, DHCP Server, SMTP (Sendmail, postfix), Secure shell (SSH) Server, NIS, NFS, Apache Web Server, Squid Proxy Server

*Windows Network Operating System*

4. Introduction (8 hrs)  
Windows network server, its features and capabilities; comparison with other servers, hardware requirements
5. Installing Windows Server (8 hrs)  
Installing server, removing server
6. Configuring Windows Server (8 hrs)  
Drivers, control panel programs; other control panels

Note : Latest release of windows network operating system should be covered

## LIST OF PRACTICALS

### Linux Server

1. Installing Linux
2. Installing and configuring X-windows
3. Installing sound drivers
4. Creating and managing user accounts
5. Establishing internet connection
6. Uninstalling linux server
7. Installing and configuring Mail server (send mail)
8. Installing and configuring ssh server
9. Installing and configuring DHCP server
10. Installing and configuring DNS server

### Windows Server

11. Installing windows server
12. Uninstalling windows server
13. Configuring windows server for drivers and control panel
14. Creating and managing user accounts
15. Creating and managing files and folders through windows explorer

## INSTRUCTIONAL STRATEGY

As the subject is for studying the various methods operating systems so the teacher should differentiate between various servers clearly which server is advantageous in a particular scenario. Live demonstration sessions can be done with the help of LCD projector.

## RECOMMENDED BOOKS

1. Linux; The complete Reference by Richard Peterson; Tata McGraw Hill, New Delhi
1. Windows 2000 Study Guide; BPB Publication, New Delhi
2. CISCO Network Design Handbook by Michal Salvagno, IDG Books India Pvt. Ltd. Delhi
3. Linux; Install and Configuration Black Book by Dee AnnleblanC and Issac Yates; IDG Books India Pvt. Ltd., Delhi
4. Linux; Network Services – Craig Hunt BPB Publication.

**SUGGESTED DISTRIBUTION OF MARKS**

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



**Elective-I**  
**5.3 (b) VISUAL C++**

**L T P Cr**  
**3 - 6 6**

**RATIONALE**

Visual programming is the programming technique to make the task easy. This type of programming has become very helpful for designing widow based application. This subject will give the student in depth understanding of the function used in visual C++.

**DETAILED CONTENTS**

- |    |   |          |
|----|---|----------|
| 1. | Visual C++  | (8hrs)   |
|    | VC++ developer studio, VC++ Runtime library, VC++ MFC and template libraries, VC++ Building tool, Active X  |          |
| 2. | C++ Classes   | (6 hrs)  |
|    | Class creation, accessing class members, encapsulation, constructor, destructors  |          |
| 3. | Deriving C++ Classes  | (12 hrs) |
|    | Class derivation, constructor for derived classes, managing classes, using class view, overloading operation, C++ template, exception handling in C++   |          |
| 4. | Windows GUI programming with MFC library  | (8 hrs)  |
|    | Creation and building the programs, source code generation, building and running program, adding message handling function, adding menu commands, adding tool bar and status bar, scrolling and splitting views |          |
| 5. | Dialog Boxes  | (8 hrs)  |
|    | Dialog boxes, design of dialog boxes, creating classes to manage dialog boxes, defining message handler   |          |
| 6. | Dialog Based Application  | (6 hrs)  |
|    | Creation of a simple dialog based application, multiple document interface  |          |

**LIST OF PRACTICALS**

1. Exercise for developing menu based application
2. Exercise on all basic control
3. Exercises using dialog boxes
4. Exercises using active X controls

## INSTRUCTIONAL STRATEGY

This subject is a practice based, so the emphasis may be given to practical exercises of visual C++ during the course of the study which in turn will reinforce the understanding of the subject.

## RECOMMENDED BOOKS

1. Master Visual C++ by Michal J Young; BPB Publication, Delhi
2. Visual C++ Programming by Stene Holzmer; Pustak Mahal, IDG Books, Delhi
3. Teach Yourself Visual C++ in 21 Days by Davis Chapman, Techmedia Publication
4. Visual C++ Programming by Yashwant Kantkar, BPB Publications
5. Visual C++ Projects by Yashwant Kantkar

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	8	10
2.	6	10
3.	12	30
4.	8	20
5.	8	20
6.	6	10
<b>Total</b>	<b>48</b>	<b>100</b>

**Elective-I**  
**5.3 (c) .NET TECHNOLOGIES**

**L T P Cr**  
**3 - 6 6**

**RATIONALE**

This is an upcoming technology, so the teacher should take pain in making the students conversant with this. The demonstration should be given using .NET software for describing the various features of .NET technology

**DETAILED CONTENTS**

1. .NET – evolution (3 hrs)  
 Need and perspective in current scenario, .net framework over view structural diagram
2. .NET framework Base classes (3hrs)  
 User and program interfaces, windows forms, web forms, console applications
3. XML (6 hrs)  
 An overview of XML, use of XML, integrity of XML with databases, XML as the .NET Meta language
4. Visual Studio .NET (6 hrs)  
 Common IDE for all languages, the common language specification, all .net languages, management of multiple language, projects
5. Language changes (6 hrs)  
 Visual basic, C++, C#, overview of C#, data types in C#, control flow in C#, C# classes
6. Anatomy of .NET Applications: (8 hrs)  
 Assembly, module, type custom types, metadata and managed data
7. What is new in visual basic .NET ? (8 hrs)
8. What is new in visual studio .NET ? (8 hrs)

### LIST OF PRACTICALS

1. Installation of .net
2. Exploring the various features of .net
3. Ability to work and start various tasks and features of .net framework
4. Able to work and develop program in Visual Basic.net
5. To explore in detail Visual Studio.net

### INSTRUCTIONAL STRATEGY

.NET being a new technology subject, the teacher should lay considerable emphasis on giving various examples while imparting instructions to the students. Practice exercises will reinforce understanding of various features of this language and will develop requisite abilities to develop programs.

### RECOMMENDED BOOKS

1. Introducing .NET by James Conard, Patrick Rengler, Birn Eranics, Jay Elynn Wron Publications

### SUGGESTED DISTRIBUTION OF MARKS

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

## 5.4 INTERNET AND WEB DESIGNING

**L T P Cr**  
**3 - 4 5**

### RATIONALE

This course will enable the students to understand the basics of internet and various application of internet like e-mail, FTP, Telnet, Newsgroups and video conferencing. In addition, this course develops competency amongst the students to design professional web sites and interactive web pages. They will have overview of different technologies like of HTML, DHTML, XML, CGI, ASP, JSP, Java Scripts, VB Scripts.

### Note:

**Since this subject is practice-oriented, theoretical instructions may be given during the practical sessions/class. The detailed contents have been given to have an idea about the exercises to be done in practical class.**

### DETAILED CONTENTS

1. Internet Basics (4 hrs)
 

Concept of internet and its evolution, Application and use of internet in various fields of Science and Technology, Specification and technical details for establishing Internet.

Types and functions of modems, IP addressing, internet domains, domain name server, TCP/IP protocols, Internet service providers, Intranets
2. Internet Connectivity (4 hrs)
 

Telephone line, cable, leased line, ISDN, VSAT, RF link
3. World Wide Web (WWW): (4 hrs)
 

World Wide Web and its evolution, web system architecture, web page, web server, HTTP protocol, search engines. Examples of web servers and cookies.

Navigation Tools: Netscape and Internet Explorer, Uniform Resource Locator (URL)
4. Internet Applications: (4 hrs)
 

E-mail; SMTP, POP3, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce

5. HTML (4 hrs)  
 Basic structure of HTML, designing a web page, basic text formatting, links, images, , fonts, sizes, simple tables and forms.  
 HTML tags, hyperlinks. Hypertext, adding graphics and images, image maps, image files, tables, forms, cascading style sheets and frames
6. Using Front Page (4 hrs)  
 Front page editor, Front page explorer
7. Client-side Scripting: Java Script, (4 hrs)
8. Introduction to Java Scripts, event handling, verifying forms, working with browser windows, embedding with HTML (4 hrs)
9. Server-side Scripting: Scripting methods, (4 hrs)
10. Java Server Pages (JSP) Gateway (4 hrs)
11. Active Server Pages (ASP) (4 hrs)  
 Text processing using ASP, Handling server/Client requests, Accessing databases, using IIS web server; ASP Objects
12. Developing Interactive Web Pages using Java scripts/ Java script/ASP / JSP (4 hrs)

### **LIST OF PRACTICALS**

1. Configuring computer system to access internet
2. Using e-mail
3. Using WWW for accessing relevant information
4. Using Telnet
5. Using FTP
6. Using IRC
7. Creating Web pages using HTML

8. Creating web pages using front page
9. Demonstration of audio-video conferencing
10. Demonstration of e-commerce transaction
11. Design of Forms using Java Script or Visual Basic Script
12. Validation of user queries and responses in the Forms using Java Script or VB script
13. Create a Homepage with frames, animation, background sound and hyperlinks
14. Design Shopping Cart for e-commerce applications
15. Develop hitometer for each client i.e. number of visitors. Visit to a site.
16. Designing simple server side program which accept some request from the client and respond
17. Establishing sessions between servers and clients
18. Design fill-out form with text, check box, radio buttons etc and embed Java script or VB script to validate users input.
19. Develop simple server side program in ASP (Active server pages) which accept some request from the client and respond.
20. Develop interface with database (MS-Access etc) for online retrieval and storage of data through HTML form.

### **INSTRUCTIONAL STRATEGY**

Since the subject is practice-oriented, theoretical instructions maybe given during practical sessions. The detailed contents have been given to have an idea about the exercises to be done in the practical classes.

### **RECOMMENDED BOOKS**

1. Internet 6-in-1 by Kraynak and Habraken, Prentice Hall of India Pvt. Ltd., New Delhi
2. Using the Internet IV edition by Kasser, Prentice Hall of India Pvt. Ltd., New Delhi
3. Using the World Wide Web, (IInd edition) by Wall, Prentice Hall of India Pvt. Ltd., New Delhi

4. HTML – 4 for World Wide Web by Castro Addison Wesley (Singapore) Pvt. Ltd., New Delhi
5. Teach Yourself HTML 4.0 with XML, DHTML and Java Script by Stephanie, Cottrell, Bryant; IDG Books India Pvt. Ltd., New Delhi
6. Using Active Server Pages by Johnson et.al. Prentice Hall of India, New Delhi
7. Java Server Pages (JSP) by Pekowsky Addison Wesley (Singapore) Pvt. Ltd., New Delhi
8. Active Server Pages (ASP) by Keith Morneau Jill Batistick Web Warriier Series Available with Vikas Publishing House Pvt. Ltd., New Delhi
9. Java Script in 24 hrs Tech Media Publications

#### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	4	5
2.	4	5
3.	4	5
4.	4	5
5.	4	15
6.	4	5
7.	4	10
8.	4	10
9.	4	10
10.	4	10
11	4	10
12.	4	10
<b>Total</b>	<b>48</b>	<b>100</b>



## 5.5 SOFTWARE ENGINEERING

**L T P Cr**  
**3 - - 3**

### 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 (S/W) Engineering (6 hrs)  
Introduction, size factors. Quality and productivity factors. Management issues, Models: waterfall, spiral, prototyping, fourth generation techniques, s/w process
2. Software Metrics Engineering (6 hrs)  
Size, function and design oriented metrics, halstead software science, McCabe's complexity
3. Planning (6 hrs)  
The development process, an organizational structure, other planning activities
4. Software Cost Estimations (6 hrs)  
Cost factors, cost estimations techniques. Staffing level estimation, estimating software maintenance costs, COCOMO
5. Software Requirements Definition (6 hrs)  
Problem analysis, requirement engineering. The software requirements specifications (SRS), formal specifications techniques, characteristics of a good SRS
6. Software Design and Implementation Issue (6 hrs)  
Fundamental design, concept design notations, design techniques, structured coding techniques coding styles, documentation guidelines
7. Verification and Validation Techniques (6 hrs)  
Quality assurance work through and inspections static analysis, symbolic execution unit testing, formal verifications. Black box and white box testing techniques

8. Maintenance Overview, Configuration Management (6 hrs)

### RECOMMENDED BOOKS

1. Software Engineering Concept by Richard Fairley, Tata McGraw Hill 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 – A Practitioner’s Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi
4. Software Testing Techniques by B Beizer
5. Software Engineering by KK Aggarwal and Yogesh Singh
6. A Software Engineering Approach by Peter A Darnell, Phillips E, Moglis, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002

### SUGGESTED DISTRIBUTION OF MARKS

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

## 5.6 MINOR PROJECT WORK

L T P  
- - 8

Minor project work aims at exposing the students to the various industries dealing with computers. It is expected from them to get acquainted with industrial environment at the shop floor and possess desired attitudes. For this purpose student during middle of the course are required to be sent for a period of four weeks at a stretch in different industries. Depending upon the interest of students they are sent for exposure to:

- 1) Industrial practices in installation and maintenance of computers and computer networks
- 2) Fabrication of computers
- 3) Fault diagnosis and testing of computers
- 4) Industrial practices in respect of documentation and fabrication
- 5) A variety of computers and peripherals in assembly organisations
- 6) Software package development organisations
- 7) Installation of computer system, peripherals and softwares
- 8) Maintenance of database
- 9) Write a stored procedure or functions which can be attached as the library objects to the main objects
- 10) Write a procedure/function to convert number of words
- 11) Write a procedure/function to convert all data function, data base connectivity, library classes in C++, use of graphics in C++, encryption decryption programme, active-x controls in VB.

**Note: The teachers may guide /help students to identify their minor project work and chalk out their plan of action well in advance.**

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities by him/her. The students should be guided by the respective subject teachers, each teacher may guide a group of 4 to 5 students.

The teachers along with field supervisors/engineers will conduct performance assessment of students. Criteria for assessment will be as follows:

	Criteria	Weightage
(a)	Attendance and Punctuality	15%
(b)	Initiative in performing tasks/creating new things	30%
(c)	Relation with people	15%
(d)	Report Writing	40%

**List of Industries where students can be sent for training/minor project**

1. Software Technology Parks of India (STPI)
2. Bhaba atomic Research Centre, Mumbai
3. DOEACC Centre, Chandigarh
4. Data Centre of J&K Bank, Gurgaon/New Delhi
5. Regional Research Laboratories of J&K and nearby cities
6. SCL, Mohali
7. CEDTI, Mohali