

HOW TO USE THESE NOTES

1. First of all, read the chapter thoroughly from study material provided by the Institute Of Chartered Accountants Of India.
2. After reading one chapter from the study material, revise the chapter immediately from these notes.
3. After that, whenever you wish to revise the chapter, you will get it within 2 to 5 minutes.
4. With the help of these notes, entire syllabus of MICS can be revised within 1½ hours. This way you can revise the syllabus of MICS 4 to 5 times in examination period.

SEQUENCE OF STUDY

In our opinion, to get best understanding & easy and fast getting of chapters, the following sequence (according to study mat.) should be followed :-

PHASE	CHAPTER NO.
1	6 to 10
2	11, 12 & 19
3	13 & 14
4	18, 15, 16 & 17
5	3, 4 & 5
6	1 & 2

REQUEST FROM ME

If these notes prove to be helpful to you (even very little), I shall think that my efforts are successful. I request you to give your feedback to me about these notes. I shall appreciate your feedback, your criticism & your suggestions. It will help me to improve these notes & write notes on some more subjects also. You can contact me at:

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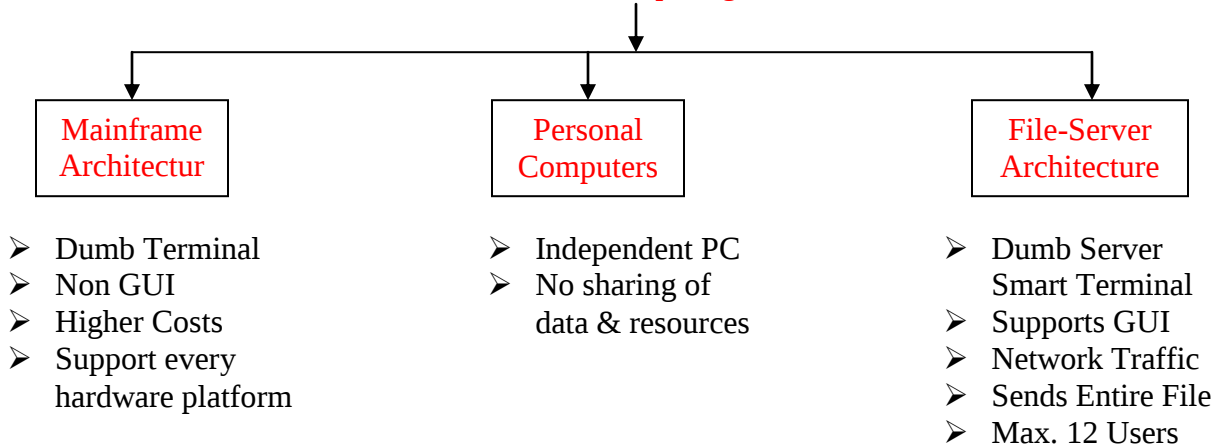
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Chapter-6 ENABLING TECHNOLOGIES

Traditional Computing Model



Client Server (C/S) Model - (Cost Reduction Technology)

- It's a form of distributed processing
- Divides processing work between server & work-station
- Server-Global Task; Client-Local Task
- Send only requested data

Advantages of C/S

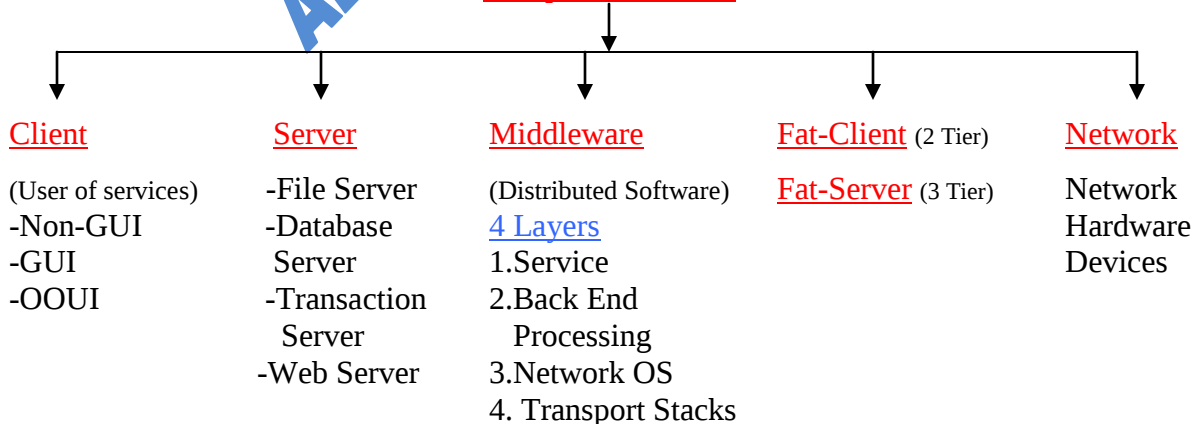
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Cost Reduction 2. Improved flow of information 3. Direct access to data 4. Increased data integrity & security 5. Better Connectivity 6. Increased Productivity | <ol style="list-style-type: none"> 7. Easy to add new hardware 8. Takes less people to maintain 9. User Friendly GUI 10. SQL capability 11. Data protection & security 12. Access to multiple servers |
|---|---|

Example of C/S :- Online Banking, Call-Centre, E-Comm., Internet

Elements of C/S

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Data Storage 2. DBMS 3. Application Software | <ol style="list-style-type: none"> 4. Operating System 5. User Interface 6. Display Devices |
|---|--|

Components of C/S



Middleware – It is a distributed software that allows client & server to connect

Service Layer – Carries coded data from software application.

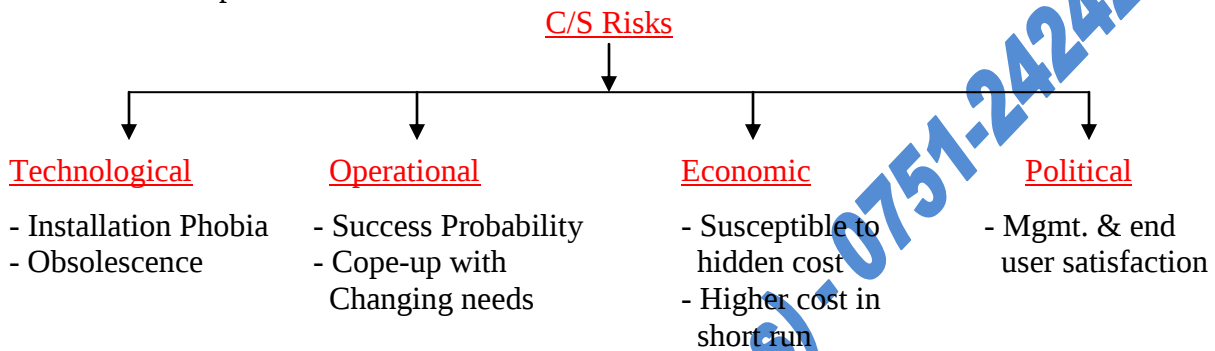
Back End Processing – Encapsulate network instructions.

Network OS – Adds additional instructions.

Transport Stacks – Transfers data packets to the designated receiver.

Considerations for C/S Security

1. Disabling Floppy Drives
2. Disk-less workstations
3. Automatic booting
4. Network Monitoring
5. Data Encryption
6. Authentication System (Log-in ID & Password)
7. Smart Card System
8. Access only to required task.
9. All access points should be known.



Server Centric Model

C/S with dumb terminals.

Processing is done on server, client does the data entry & gets display of information.

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Chapter-7

SYSTEM DEVELOPMENT PROCESS

- Process of examining of business situation with the intent of improving it.

[System Analysis](#)

[System Design](#)

System Development Life Cycle (Traditional Approach)

- Preliminary Investigation
- Requirement Analysis
- System Analysis (*Present & Proposed*)
- Design of System
- Acquisition & Development of software
- System Testing
- Implementation & Maintenance

Reasons for failure to achieve system development objectives

1. Lack of senior management support
2. Changing user needs
3. Difficult to design strategic system (Because they are unstructured)
4. Incompatibility of staff with new technology.
5. No proper standard & method of project management & system development
6. Over-worked or under-trained development staff
7. Resistance to change
8. Lack of user participation in development
9. Inadequate testing & training.

System Development Approaches

1. [Traditional Approach](#)

- Activities are performed in sequence
- Work performed in each stage are reviewed by managers & users
- It takes years to develop, analyse & implement.

2. [Prototyping Approach](#)

- Used to develop smaller systems
- Useful when system requirement is not known or difficult to determine
- Developed in small parts (*prototypes*) & at lesser cost
- Developed prototypes are refined & either turned into final system or scrapped to develop a new real system

[Four Steps](#)

- a) Identifying information system requirement
- b) Develop the initial prototype
- c) Test & Revise
- d) Obtain user's approval

[Advantages](#)

Less time consuming, Active user participation, More reliable Less costly

3. End User Development Approach

- End user is responsible for system development
- Low-cost technology
- Decline in standards & controls
- Reduction in quality assurance
- Unrelated & incomplete systems
- No experienced staff

4. Top Down Approach

- High Degree of top mgmt. involvement

Stages:

- 1) Analyse the objectives & goals of the entity
- 2) Identify the functions. e.g. – Production, Marketing, R & D
- 3) Ascertain the major activities, decisions & functions
- 4) Find out the information requirement
- 5) Prepare information processing program

5. Bottom Up Approach

- Starts from Supervisory management (Used to design various sub-systems)
- Identification of life stream systems that are essential for day to day activities
- Identify basic transactions, file-requirements & programs and develop system for each such life stream
- Integration of data & such systems
- Addition of decision models & planning models
- Involvement of supervisory management.

6. Systematic Approach

- Used in small organizations in which no MIS personnel is involved.

Steps:

- 1) Identify requirements
- 2) Locate suitable software & hardware
- 3) Implement the system

Reasons for Project Failure

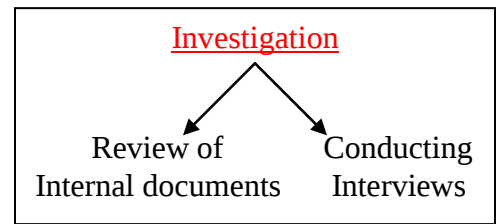
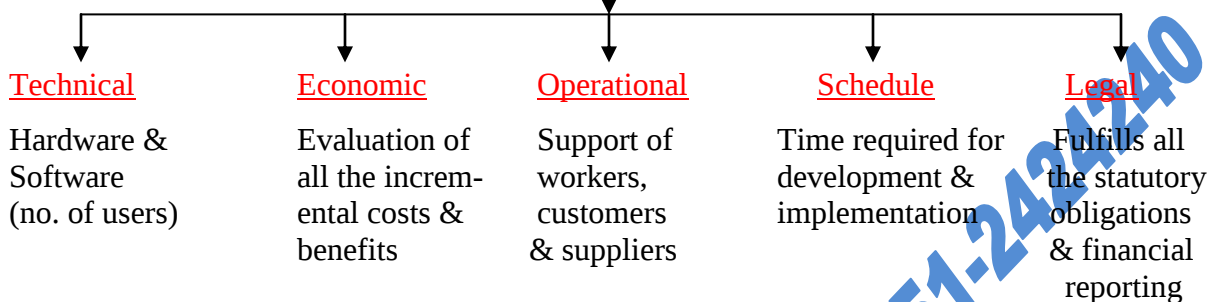
- Under estimation of time
- Lack of senior mgmt. participation
- Under estimation of resources
- Under estimation of size & scope of project
- Inadequate control
- Inadequate planning
- Changing system specifications

System Development Methodology

- Formalized, standardized & documented set of activities used to manage system development project. Division of project into small modules.
- Deliverables (Specific report & documentation) must be produced periodically
- Approval of development process by users, managers & auditors (Sign Offs)
- System Testing
- Proper Training
- Prevent unauthorised changes to complete program by formalizing system modifications.
- Post implementation review.

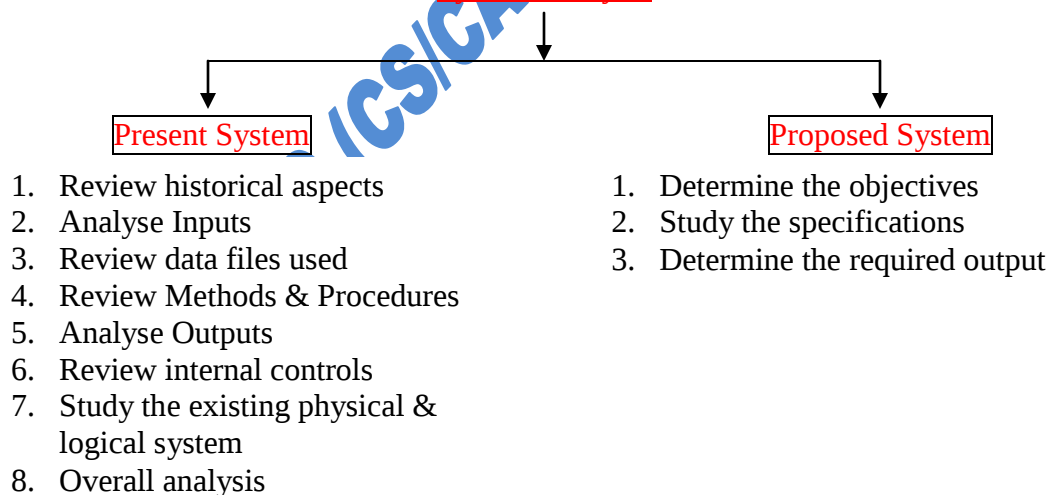
Preliminary Investigation

1. Starts when a problem / opportunity is identified by user or manager.
2. Clarify & understand the project request.
3. Determine the size of the project
4. Determine the feasibility of alternative approaches
5. Determine their costs & benefits
6. Final report to the management with recommendations.

FeasibilityRequirement Analysis

- Determining user needs
 - Study of application area in depth
 - Assessing the strengths & weaknesses of present system
 - Reporting to management
 - Fact Finding Techniques
1. Documents
 2. Questionnaire
 3. Interviews
 4. Observations

Input forms, Output forms, Organization Manual / Chart

System AnalysisSystem Development Tools

1. System Flow Chart (Documents flow of system & information processing procedures)
Presented by variety of symbols & connecting arrows.

2. Data Flow Diagram (Flow of data within an organisation)
[Data sources & destinations, Data flows, Transformation process, Data Stores]
Symbols in DFD – □ Data Source & Destination
→ Data Flow
○ Transformation Process
= Data Storage
3. Lay out forms & screens (Pre printed forms)
Used to design source document, output, display.
4. System Components Matrix
Highlights basic activities of a system. e.g. – Input, Processing, Output & Storage
5. CASE Tools (Automation of anything that human do to develop systems)
6. Data Dictionary (Computer file containing descriptive information about the data items)
 - It contains information about each data item stored in the system, file in which it is stored, program that modifies it, authorised users & unauthorised persons.
 - It is updated with every change in data item.
 - Gives an audit trail to the auditor & helping aid in investigation.

Category of Tools

1. System Components & Flows
2. User Interface
3. Data attributes & relationships
4. Detailed system process

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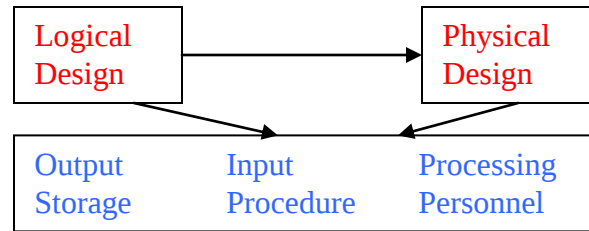
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Chapter-8

SYSTEMS DESIGN

1. Review System's Requirements
2. Developing a model
3. Reporting to Management



Output (Report, Document, Message) → Displayed
 → Printed

Objectives

1. Convey Information (*Past, Current & Future Projections*)
2. Signal important events
3. Trigger an action
4. Confirmation of an action

Determinants of Designing

1. Content (Piece of data included in output, it must be objective)
2. Form (Refers the way of presenting content – Text / Graphical / Audio)
3. Volume (Amount of data output required – High Speed Printer / Monitor)
4. Timeliness (Daily / Weekly / Monthly or on real time basis)
5. Media (Paper / Display / Audio / Video)
6. Format (Manner in which data are arranged – Tabular / Graphic)

Input (Efficient data capture, effective coding & appropriate data entry methods)

Guidelines for form designing

1. Easy to fill (logical division, proper flow, captioning)
2. Purposeful
3. Accurate completion
4. Attractive

Characteristics of good coding scheme

[Code: - Brief no./title/symbol used instead of lengthy/ambiguous description]

1. Unique Code
2. Brief
3. Convenient
4. Expandability (compatible with future growth)
5. Suggestive
6. Permanence

Coding Schemes

1. Classification codes (Used to classify record in a particular class)
2. Function codes (Used to describe a function e.g. – sold, delivered)
3. Significant digit subset codes (Permanent Account No.)
Entire code is divided into meaningful parts.
4. Mnemonic Code (Linking with description e.g. MBA, C.A., C.S.)
5. Hierarchical Classification / Progressive Code

Data Storage Individual File System & DBMS

Design of data communication (Simple & Cost effective)

System Manual: (Contains Description, Flow, Output, Input, Persons responsible)

Chapter-9 System's Acquisition, Software Development & Testing

Acquisition of Hardware

1. Latest possible technology.
2. Speeds & capabilities.
3. Software Considerations.
4. Compatibility to future expansion.
5. Vendor selection & machine selection

Acquisition of software (Pre-packaged Application Software)

(Sources may be computer manufacturer, software houses, retail stores, user groups)

Advantages

- | | |
|-------------------------|---------------------------------|
| 1. Rapid Implementation | 3. Low Risk |
| 2. Quality | 4. Lower Cost (No hidden costs) |

Steps for selection of a computer system

- | | |
|--|---|
| 1. Prepare design specification. | 2. Distribute request for proposal (RFP) |
| 3. Analysis of proposals. | 4. Contact present users of proposed system |
| 5. Conduct Benchmark Test.
(Actual testing of the system) | 6. Select the equipment/system. |

Evaluation & Ranking of Proposals (Factors)

- | | |
|------------------------------------|---|
| 1. Capability & Quality | <div style="border: 1px solid black; padding: 5px; width: fit-content;"> System Maintenance
 System Development Support
 Training
 Back-up
 Complement Hardware / Software </div> |
| 2. Cost-Benefit Analysis | |
| 3. Cost of maintenance | |
| 4. Compatibility | |
| 5. Services provided by the vendor | |

Method of Evaluation

1. Checklists (Subjective Method)
2. Point-scoring analysis
3. Public evaluation reports (consultancy agency, present users, financial statement analysis, credit rating agency)

Development of Software

Stages [Program Development Life Cycle]

1. Program Analysis. [Analyse the output required, input available & processing]
2. Program Design. [Planning the basic layout of the program e.g. Flow Charts, etc.]
3. Program Coding [Flow Charts converted into program statements. Eg:- Interpreter or Compiler] Coded instructions are entered into a magnetic media that constitutes source language. Then it is translated into machine language. It should be simple, short & require less processing time.
4. Debug the program. [including walkthrough, tests & review of program codes]
5. Thorough testing of the program.
6. Documentation.
7. Program maintenance.

Tools

1. Program Flow Charts. (Graphical Format)
 2. Pseudo Code. (English-Like statements)
 3. Structure Chart. (Similar to organization chart ; No program logic)
 4. 4GL Tools. (Automation of manual task)
 5. Object Oriented Programming & Designing Tools.
- } Represents program logic

System Testing

- a. Preparation of realistic test data.
- b. Parallel operation with the existing system.
- c. Thorough checking of the results.
- d. Review of the results.

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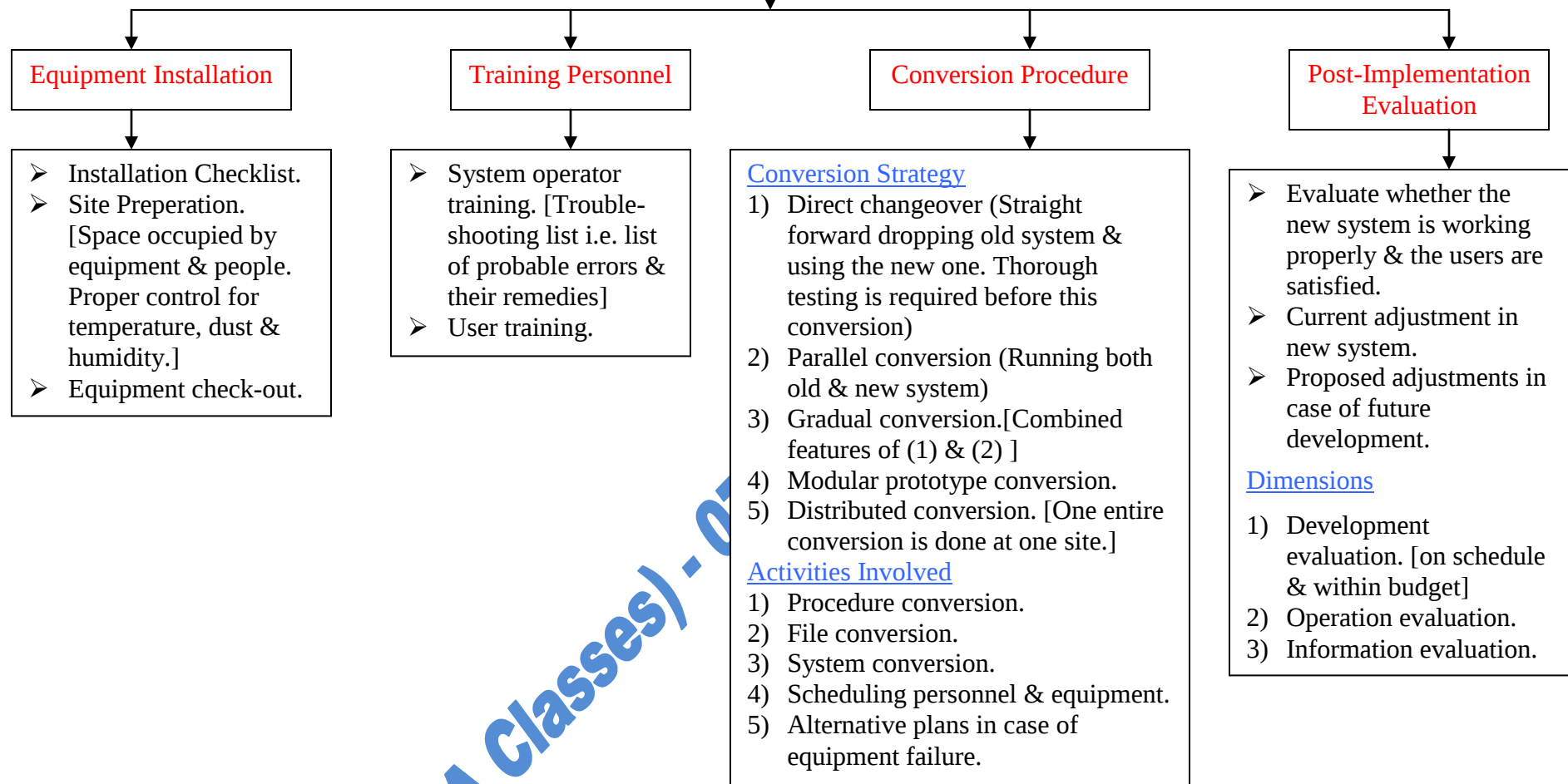
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Chapter - 10

System Implementation & Maintenance

System Implementation



Chapter -11**Design Of Computerised Commercial Applications****Accounts Payable System**

Details of amount payable for goods & services received from vendors.

- 1) Due date.
- 2) Rate of discount/interest.
- 3) Optimum utilization of money to maximize return. Inputs :- Challans, Bills, etc. ; goods receipt note.

Payroll Accounting System

- 1) Working hours through attendance cards.
- 2) Calculation of Gross Earning.
- 3) Computing deductions.
- 4) Net amount payable.

Payroll master file – Contains personal data of each employee, their basic pay, payment due & actual payment.

Inventory Control System {Raw Material, WIP & Finished goods}

- 1) Optimum level of inventory to :-
 - i. Avoid “Stock-Out” position.
 - ii. Avoid undue blockage of Working Capital.
 - iii. Minimize ‘Carrying & Storage Cost’.
- 2) Back-Order file. [updated for sales orders that cannot be filled because of stock-outs.]
- 3) Various inventory levels, current stock.
- 4) Vendor details.

Inventory master file – Contains quantity of each item, their location, quantity ordered, re-order point & vendor details

Sales Order Processing

- 1) Co-ordination with accounting department & inventory department.
- 2) Back-order file.

A/c's Receivable master file – Contains customer details, credit limit, credit rating and balance due.

Cost Estimation

Cost for each order is determined by using “Standard Costing”.

Financial Accounting

- 1) Entering transactions & keeping track of various balances.
- 2) Trial Balance, Profit & Loss A/c and Balance Sheet.
- 3) Regular processing & year-end processing.

Share Accounting

- 1) Maintain an updated list of share-holder along with their personal details.
- 2) Inputs :- Share transfer form along with certificates.
- 3) Dividend warrant, splitting & consolidation of shares, mailing annual report & notices of various meetings.

Common Points in all of the above applications

- 1) Batch Processing / Online Processing depending upon the requirement of the concern.
- 2) Various sources & details of input.
- 3) Contents & Format of output generated.
- 4) User of output.

Chapter - 12

Enterprise Resource Planning - Redesigning Business

Integrated software solution to all the functions of an organization.

Definition

ERP is a fully integrated business management system covering all functional areas.

Eg :- Logistics, Production, Finance, Accounting & Human Resource.

It organizes & integrates the above-stated operations to make optimum use of resources & maximize return. It does the same thing but in a different manner.

Benefits

- | | |
|----------------------------------|---------------------------------|
| 1) Assists employees & managers. | 6) Reduction of paper document. |
| 2) Production scheduling. | 7) Timeliness. |
| 3) Optimum capacity utilization. | 8) Accuracy. |
| 4) Reduce Inventory. | 9) Quick response. |
| 5) Better services to customers. | 10) Competitive advantage. |

Whole being greater than the sum of its parts.

Characterstics

1. Integration of all organization processes.
2. Flexibility.
3. Modular & open system architure.
4. Comprehensive. [Wide range of business organizations]
5. Beyond the company.
6. Best Business Practices.
7. Use of EFT, EDI, Internet, Intranet, E-Comm., etc.

Business Process Re-engineering [BPR]

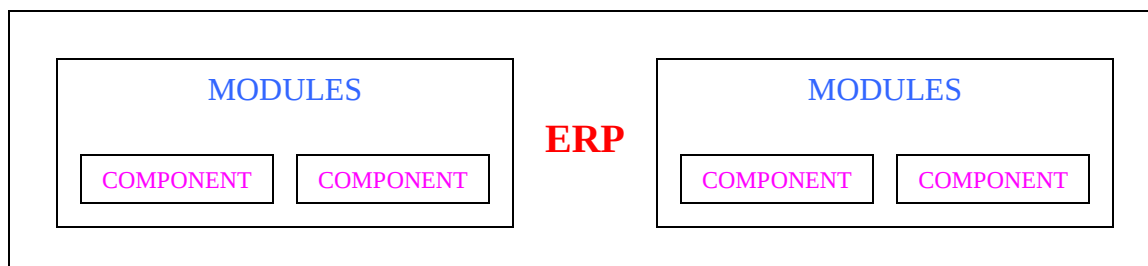
BPR is the fundamental re-thinking & re-designing of processes [not enhancing or improving] to achieve dramatic improvement.

Business Engineering = BPR + Information Technology

Re-thinking of business processes to improve speed, quality & output.

Business Modelling

- Consists of Core Business Processes/Activities & their inter-linking in a diagrammatic form.
- Planning – Top down approach.
- Execution – Bottom up approach.
- Readymade Business Modeling Templates are also available in the market.



Method Of Implementing ERP

Before implementation ERP must be divided into modules & components. It must be customized as per the requirement. Implementation must be formalized.

- Identifying the needs for implementing ERP.
- Evaluating the present situation.
- Deciding the proposed situation.
- Re-engineering of processes.
- Evaluation of various alternative ERP packages.
- Finalizing the ERP package.
- Installation of required Hardware & Network.
- Hiring the ERP consultants.
- User training.
- Final implementation of ERP package.

ERP Vendors

- 1) Baan (The Baan Company)
- 2) Oracle (Oracle)
- 3) R/3 (SAP)
- 4) System 21 (JBA)

Determination of ERP package

1. Flexibility. [Ability to change according to future requirements]
2. Comprehensive. [Applicable to all industries]
3. Integration.
4. Beyond the company. [Supports processes with customers, suppliers, banks, etc.]
5. Best Business Practices. [Best Business Practices stored in ERP knowledge base]
6. New technology.

Implementation Guidelines

1. Analyse the corporate needs.
2. Business Process Re-engineering.
3. Establishment of good network.
4. Leadership & Motivation.
5. Appointment of Project Manager.
6. Hiring of consultants.
7. Selection of suitable package.
8. Training.
9. Final implementation.
10. List down the Critical Success Factors (CSF's) at departmental level.
11. Numeric values assigned to CSF's is called Key Performance Indicators (KPI's).

Life after implementation

<u>Positives</u>	<u>Negatives</u>
1. Increased productivity. 2. Automation of processes. 3. Improvement in KPI's. 4. Elimination of manual work. 5. Total integration. 6. Real-time information. 7. Improved networking features.	1. Job redundancy. 2. No secrecy of departmental data. 3. Loss of control & authorization.

ERP Audit

- Necessary for ensuring the proper functioning of ERP package.
- May be specific or general.
- Evaluation of security, authorization & control.
- ERP audit trail.

Modules of ERP software package

1. Financials. [Financial Accounting, General Ledger, Accounts Receivable/Payable, fixed Assets Accounting, etc.]
2. Controlling. [Cost Centre Accounting & profitability analysis]
3. Investment Management. [Budgeting, Appropriation, Depreciation forecast]
4. Treasury. [Cash, Fund & Market risk management]
5. Integrated Enterprise Management. [Accounting data prepared by subsidiaries are automatically incorporated for corporate reporting. It has 3 modules :-

Enterprise Controlling – Consolidated Statements	Enterprise Controlling – Profit Centre Allocation	Enterprise Controlling – Executive Information System
➔ Automatic consolidation of various branches & subsidiaries. ➔ Inter-branch transfers are eliminated.	➔ Consolidated figures are allocated to respective profit centres. ➔ Inter-branch transfers are considered.	➔ EC-CS & EC-PCA are integrated & inter-firm comparison are made for decision making.

6. Sales & Distribution. [Product billing on a real-time basis. Sales, calls, quotations, inquiries, marketing, competitors & their products. Pricing is carried out automatically & verification of availability checks.]
7. Product Data management (PDM) [Creating & managing product data throughout product life-cycle]
8. Product planning & control.
9. Material management. [Purchasing, Inventory, Warehousing & Invoice verification]
10. Human Resource Management. [Employee master data, Recruitment management, Selection & Training]
11. Payroll Accounting.
12. Internet & Intranet.

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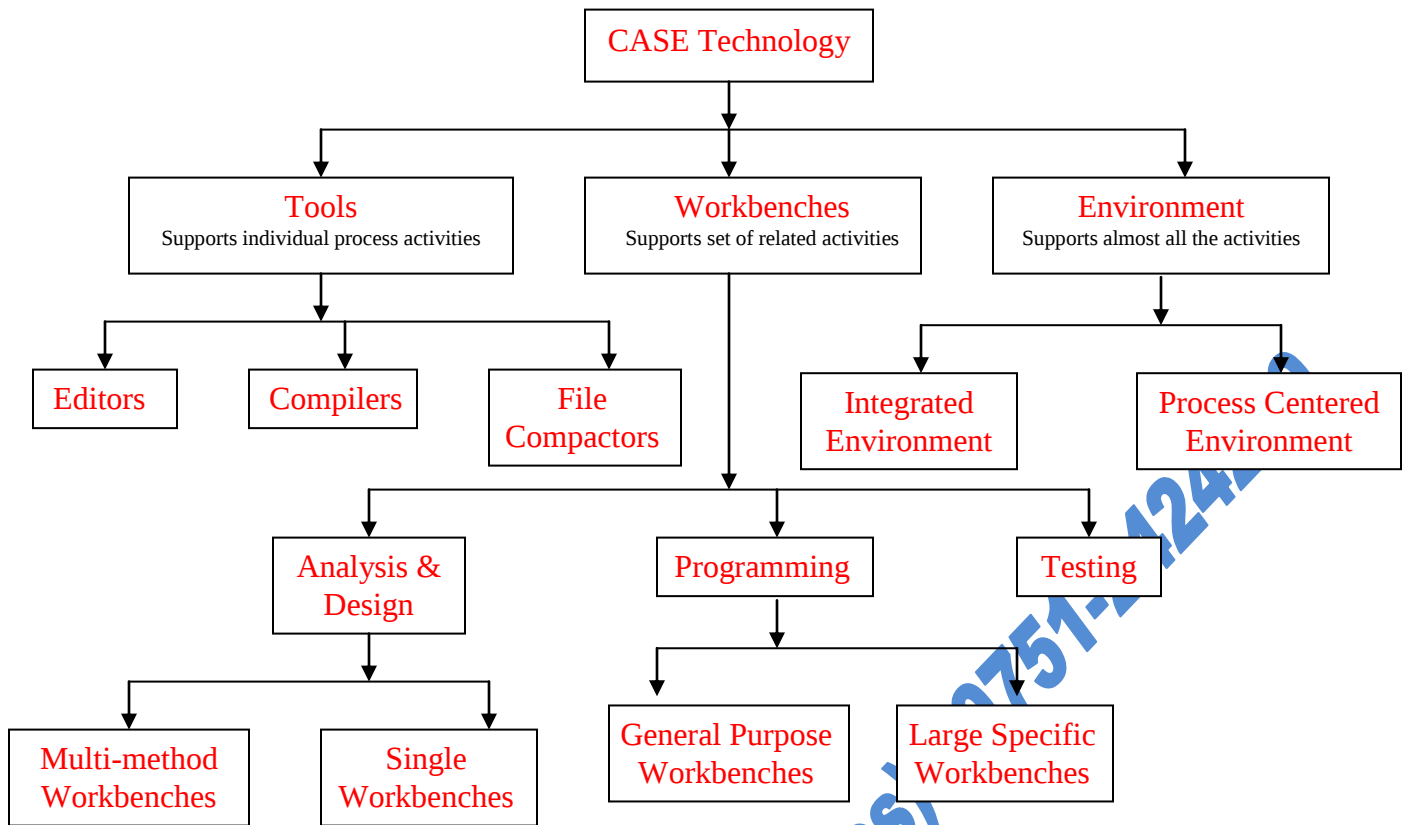
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Chapter - 19

CASE Tools and Digital Technology



CASE Tools

- Concerned with creation & maintenance of system software
- Automated tools to solve specific problems

Integrated CASE Tools

- Specialised CASE Tools are combined together to form an integrated CASE Tool.
- 5 Levels :-

1. Platform Integration

Integration of all the tools/workbenches run on the same platform. Platforms may be a computer / network / operating system.

2. Data Integration

- Process of exchange of data by CASE Tool.
- 3 Levels
 - i. Shared Files :- All the tools recognise a single file format.
 - ii. Shared Data Structures :- Make use of shared data structures including programme/design language information.
 - iii. Shared Repository :- Integrated around a object management system.

3. Presentation Integration

Tool use a common standard presentation for user interaction.
[Window System, Comparable Functions and Interaction Integration]

4. Control Integration

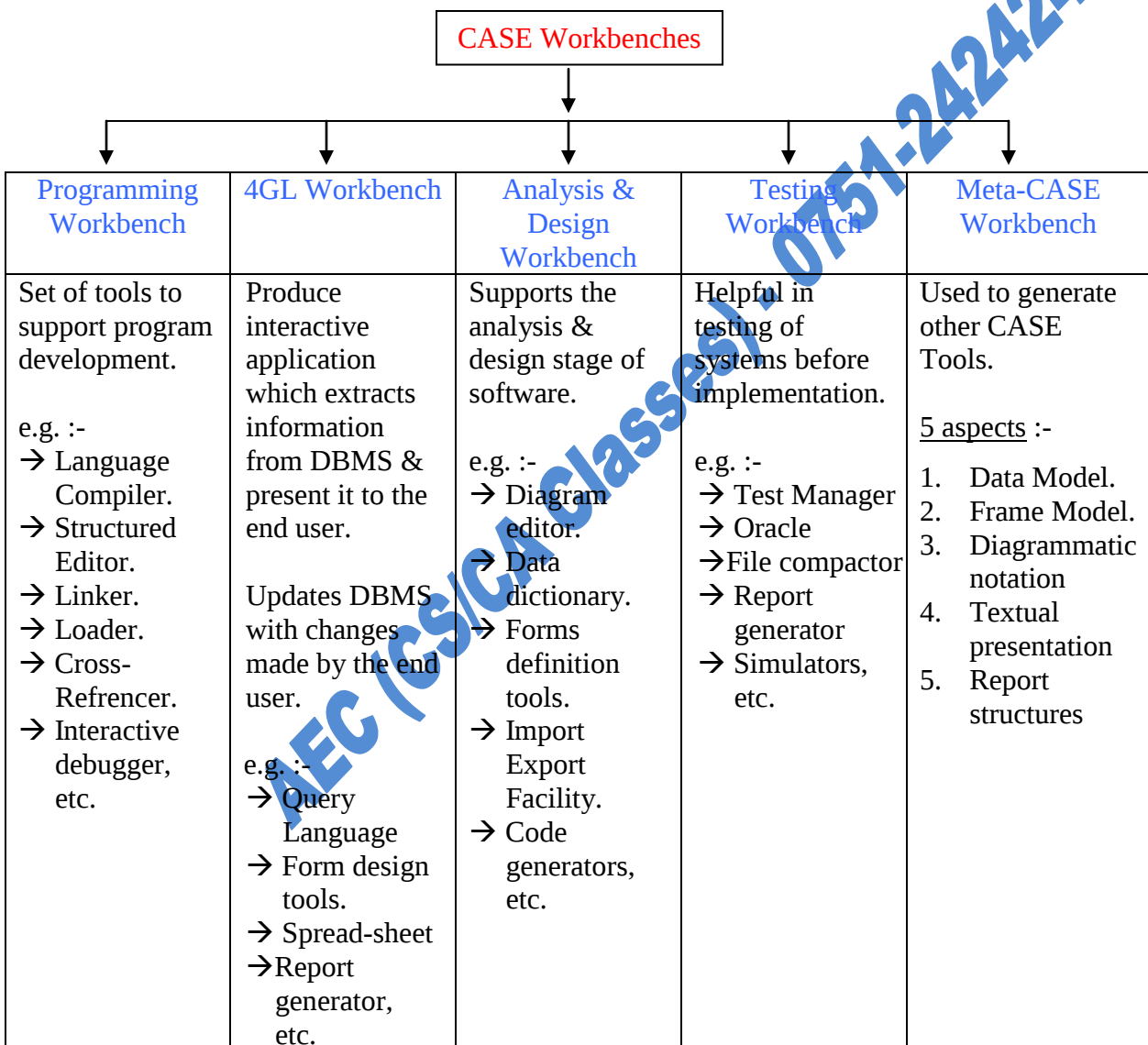
Mechanism to control the integration of other CASE Tools.

5. Process Integration

Integrates the knowledge about processes, their phases, their constraints, etc. to support their activities.

Typical Components of a CASE Workbench

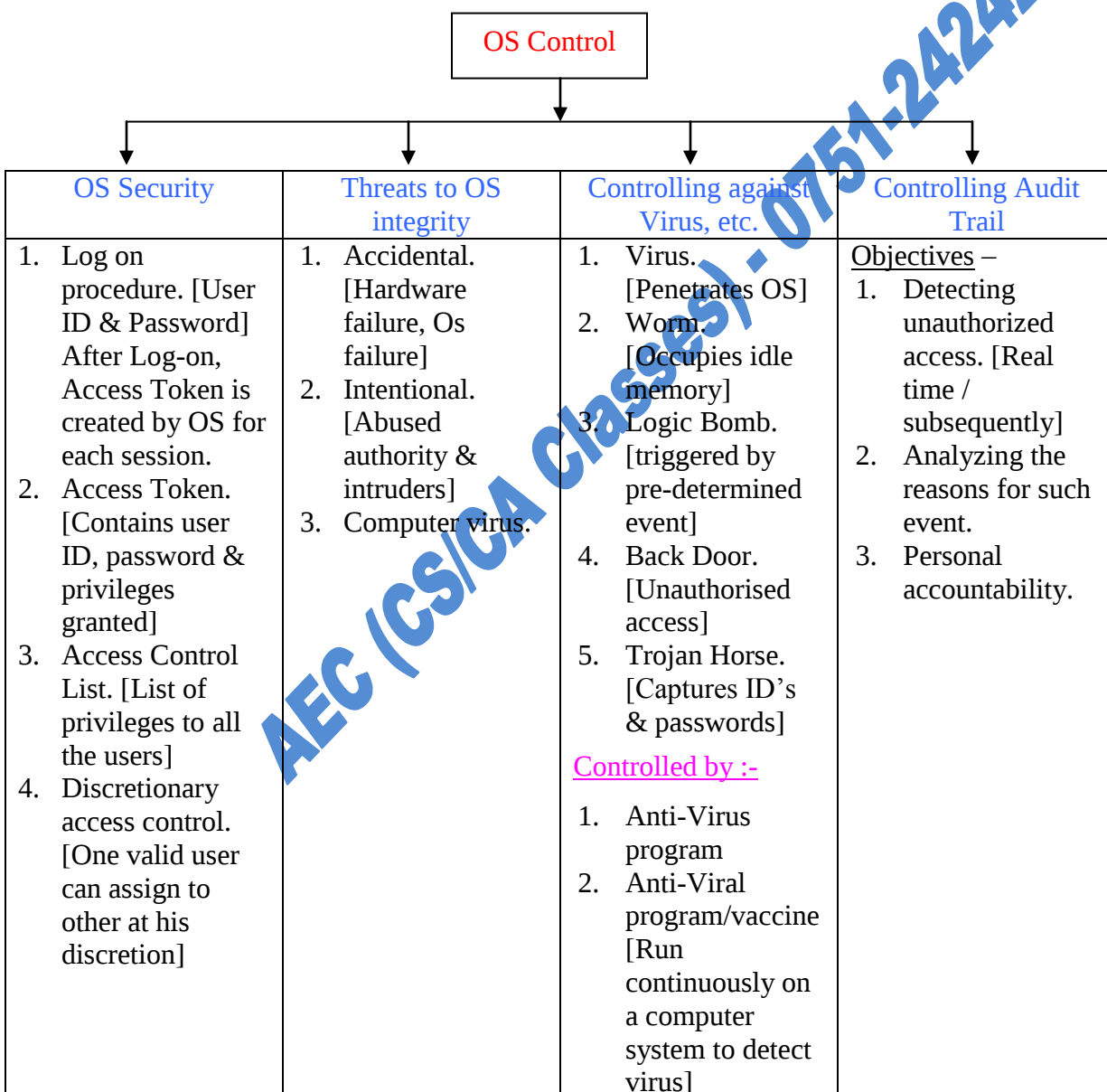
1. Diagram Editor.
2. Analysis, Checking & Correction.
3. Query Language.
4. Data Dictionary.
5. Report Generator.
6. Import/Export facility.



Chapter - 13**General Controls in EDP Set -up****1. Operating System Control**

- Main functions of operating system are language translation, allocation of Computer resources, job-scheduling, multi-tasking & lots more.
- Objectives of Operating System Control

Protection	
Of	From
Operating System	Itself
Operating System	Its environment
Operating System	Users
Users	Each other
Users	Themselves

**2. Data Management Control**

Access Controls	Back-up Controls
➤ <u>Flat File System</u> – Easy to control. ➤ <u>DBMS</u> – 5 control features :- 1. <u>User View</u> – Privileges to required users only. 2. <u>Database Authorization Table</u> – Contain actions a user can take. 3. <u>User Defined Procedures</u> – Series of personal questions. 4. <u>Data Encryption</u> 5. <u>Biometric Devices</u> – Finger Prints, Voice Prints, etc.	➤ Back up may be in <u>magnetic disc</u> or in <u>magnetic tape</u>. ➤ 4 features :- 1. <u>Back-up</u> 2. <u>Transaction Log</u> – Provides an audit trail. 3. <u>Checkpoint</u> – Several checkpoints in 1 hour. 4. <u>Recovery Module</u>

3. Organisation Structure Control

- i. Separating System Development from Computer Operations.
- ii. Separating System Development from Maintenance.
- iii. Separating Database Administration from other functions.
- iv. Separating Data Library from Operations.
- v. An Alternative Structure for System Development.

4. Computer Centre Security & Control [It may be accidental or incidental.]

Risks	Controls
1. Fire Damage 2. Water Damage 3. Energy Variations 4. Pollution Damage 5. Unauthorised Intrusion	1) <u>Disaster Recovery Plan</u> i. Emergency Plan ii. Back-up Plan iii. Recovery Plan iv. Test Plan 2) Insurance of Hardware & Data

5. <u>System Development Controls</u>	6. <u>System Maintenance Control</u>
i. <u>System Authorisation</u> – Evaluation of the system before the development. ii. <u>Users Specifications</u> – Active involvement of user during the development phase. iii. <u>Technical Design</u> – Documentation of user specifications and development process. iv. <u>Internal Audit Participation</u> v. <u>Program Testing</u> vi. <u>User acceptance</u>	i. <u>Maintenance Authorisation, Testing & Documentation.</u> ii. <u>Source Program Library (SPL) Controls</u> – Documentation of retrieval, change, obsolescence, etc. of program in SPL. iii. <u>Password Control in SPL</u> iv. <u>Audit Trail & Management Report</u> v. <u>Program Version Number</u> vi. <u>Message Sequence Numbering</u>

7. Internet & Intranet Controls

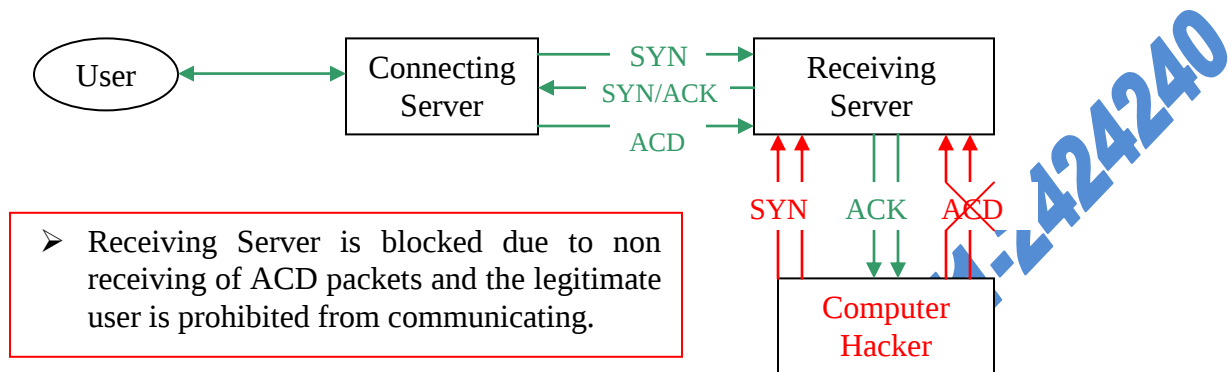
- 2 types of risks :-
 - i. Component Failure – Communication Line, Hardware & Software.
 - ii. Subversive Threats – Unauthorised Intrusion.
 - a) Invasive Tap – Can read & modify data.
 - b) Inductive Tap – Can read only.

- Subversive Attacks – Insert / Delete / Modify / Alter the sequence / Discard / Delay Messages.
- Control features :-

1) Firewall

- Controls the communication between two networks. Insulates the organisation's network from external networks.
- 2 Types :-
 - Network-level Firewall – Low cost & low security level.
 - Application Level Firewall – Costly & higher security level.

2) Controlling Denial of Service Attacks



3) Encryption [Clear text → Cipher text → Clear text]

- Conversion of data into secret codes for storage / transmission.
- 2 types :-
 - Private Key Encryption** – Single key used by both sender and receiver.
 - Public Key Encryption** – Public key is used to encrypt the data and private key is used to decrypt the data.

4) Message Translation Log

Record of all incoming & outgoing messages.

5) Call Back Devices

Calls back only the valid user to establish the connection.

8. Personal Computer Controls

Reasons	Controls
1. Incompatibility of Hardware / Software. 2. Poor Data Security 3. Decentralisation of processing 4. Computer Virus 5. No thorough testing. 6. Weak access control 7. Inadequate Back-up procedures	1. Centralizing PC purchase 2. Physical locking of hardware 3. Regulating the use of floppy 4. Proper training 5. Virus prevention 6. <u>Proper Back-up arrangement</u> – Floppy, Dual Internal Hard Disks, External Hard Disk, Tape Back-up. 7. Multi-level password control.

Chapter-14

Application Controls in EDP Set-up

Input Controls

1. Source Document Control

Pre-numbered ; Used in Sequence ; Periodical Audit

2. Data Coding Control

- i. Transcription Error (addition / truncation / substitution)
- ii. Transposition Error (e.g. 38276-83276)

⇒ Measure – Check Digit (11-module check digit)

3. Batch Control

- i. Batch Transmittal Sheet – It is prepared by user department & submitted along with batch of source document. It contains Batch no., Date, Transaction Code, Batch Totals. [Batch Totals = Record Count, Hash Total & Control Total]
- ii. Batch Control Log – Contains the details of all the batches processed during a period.

4. Validation control

Field Interrogation	Record Interrogation	File Interrogation
➤ Examines the characters in the field. i. Limit Check ii. <u>Data Type Check</u> (alphabetic / numeric) iii. Valid Code Check iv. Check Digit v. Arithmetic Check vi. Cross Check	i. Sequence Check ii. Completeness Check iii. Combination Check iv. Redundant Data check v. Password vi. Authorisation	➤ It ensures that the required file is being processed. i. Internal Label Check ii. Version Check iii. <u>Expiration Date Check</u> – Prevents deletion before expiry.

5. Input Error Correction

- i. Immediate Correction – at the time of input
- ii. Create an Error File – correction at a later time
- iii. Reject the Entire Batch – processing is done when all the records are made correct.

Processing Controls

1. Run-to-Run Control

- Monitors the batch as it moves from one programmed procedure(run) to another.
- Ensures that the batch is processed correctly and completely at each run.
- Recalculates control totals; Transaction Codes; Sequence Checks.

2. Operator Intervention control

Control of various tasks in which active involvement of operator is required.

3. Audit Trail Control

- Proper documentation of all the transactions.
 - (i) Transaction Logs (Log of all successful transactions)
 - (ii) Transaction Listings
 - (iii) Error Listings (List of unsuccessful transactions)
 - (iv) Log of Automatic Transactions
 - (v) Listing of Automatic Transactions
 - (vi) Unique Transactions Identifiers

Output Controls

- Ensures that output is not lost / corrupted and their privacy is maintained.

1) Tape & Disk Output Controls

- ⇒ Parity Bit Checking (*Hardware Controls*)
- ⇒ Check Digits (*Software Controls*)
- ⇒ ECHO Check

2) Printed Output Controls

- i. *Verification of output* [Output directly / indirectly related to inputs and exception reports]
 - ii. Distribution of output
 - iii. Procedure for acting on exception reports
- ⇒ Real time system output are exposed to disruption, destruction, corruption, etc.

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Chapter - 18

Information Security

- **Information Security** means protection of valuable information within the organisation by applying various standards, measures, practices & procedures.

Objective of Information Security

1. Protecting the interest of the users of the information.
 2. Protecting the Information System.
 3. Protecting the communication.
- The security objective is met when the following conditions are satisfied :-
- (i) Availability – Information is available whenever required.
 - (ii) Confidentiality – Disclosed only to authorised persons.
 - (iii) Integrity – Protected against unauthorised modifications.

Sensitive information

Strategic Plans; Business Operations (List of client's name & add.); Financial Information.

Principles of Information Security

1. Accountability – It must be formalized & communicated. Use of proper audit trail.
2. Awareness
3. Multi-disciplinary – Technological and non-technological issues.
4. Cost Effectiveness
5. Integration – Security system must be co-ordinated.
6. Re-assessment – Periodical changes.
7. Timeliness – Monitoring & timely response.
8. Social factors – Respecting rights / interests of others.

3 types of Information Protection

1. Preventative Information Protection

- (i) Physical (e.g. locks and guards, floppy access lock)
- (ii) Logical / Technical (e.g. passwords & authentications, etc.)
- (iii) Administrative (e.g. Security awareness)

2. Restorative Information Protection

⇒ Timely restoration of lost information after occurrence of the event.

3. Holistic Protection

⇒ Planning for unexpected and unknown events to happen.

Approach to implement Information Security.

- 1) Designing Security Policy that defines acceptable behaviors and reactions in case of violations.
- 2) Proper communication of Roles & Responsibilities to individuals –

Individuals	Responsibilities
Executive Management	Overall responsibilities
IS Security Professionals	Design & Implementation of security policy.

Data Owners	Maintaining accuracy & integrity
Process Owners	Ensuring appropriate security embedded in there IS.
Technology Providers	Assist in implementation of Information Security System.
Users	Follow the set procedures.
IS Auditors	Independent assurance.

- 3) Designing of Information System Security Framework after the policy has been approved by the governing body.
- 4) Timely Implementation of Information Security System after designing of framework.
- 5) Continuous Monitoring, disciplinary & corrective actions.
- 6) Adequate Training, Education & Awareness program to ensure proper functioning of Information Security.

Security Administrator

- Responsible for controlling and co-ordinating the activities related to security aspects.
- Ensures adequate Information Security; Sets Policies; Investigates; Advices; Trains the users; Monitors the activities related to Information Security.

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Chapter - 15

Detection of Computer Frauds

⇒ **Computer fraud** means obtaining unfair advantage over another person, computer, or organisation using computer, computer network or computer resources.

Computer Fraud includes

- Theft, unauthorised access, modification, copy or destruction of software, sensitive & confidential information.
- Theft of money using computer.
- Theft, destruction of computer hardware.
- Financial / reputational damage to a business using computer.

Examples of Computer Frauds

- Investment fraud (offering high rate of return)
- Secret market fraud (pretends & influence that there is a confidential market for a particular financial instrument offering a high rate of return)
- Pyramid Schemes (offer high return on contribution & invariably collapse)
- Hacking (unauthorised access / modification to data / software)
- Cracking (Hacking with malicious intention)
- Abuse of computer system by employees (for personal purpose)
- Software piracy (unlicensed copy of software)

Primary Risks to business

Internal Threats	External Threats
1. <u>Input</u> [alter computer input] ✓ Collusive fraud (Banking Fraud) ✓ Disbursement Fraud (payment against false bills) ✓ Payroll fraud (fictitious employees) ✓ Cash receipt fraud 2. <u>Processor</u> [unauthorised use of computer system / services / time] 3. <u>Computer Instructions</u> [tampering with the software] 4. <u>Data</u> [altering / damaging / copying company's data] 5. <u>Output</u> [misuse of printed / displayed output] 6. <u>e-mail</u> [altering the content]	1. Removal of information 2. Destruction of integrity 3. Interference with web pages 4. Virus by e-mail 5. Interception of e-mail 6. Interception of EFTs

Reasons for Internet Fraud

- Unregulated (no license fee, no central authority)
- Low cost
- Global reach
- Difficult to distinguish genuine from fraud
- No verification system for genuineness of information

Preventing Computer Fraud

- Adequate system security & regulation thereof.
- Adequate appointment procedure for new joiners.
- Proper action against fraudulent employees.
- Manage the employees eager to take revenge.
- Education & training regarding security & fraud prevention measures.
- Developing a strong internal control system
- Segregation & rotation of duties
- Restriction on computer / data access
- Encrypt data & programs
- Protect telephone lines
- Protect the system from virus
- Control on use of laptop, floppy drives, etc.

Detection methods

- Conduct audit at regular interval
- Appointment of Computer security officer
- Hiring of computer consultants
- Maintenance of System activity log
- Fraud detection software
- Computer forensic tools – In this technique deleted files are recovered. Exact copy of disk is taken through disk imaging technique & investigation is done without the knowledge of the fraudster. [Disk Imaging & Analysis Technique]

Security methods

- Take proper insurance cover
- Keeping back-up at remote location
- Develop contingency plan
- Using special software to monitor the activities

Chapter-16

Cyber Laws and Information Technology Act, 2000

Objectives of the Act

- Grant legal recognition to electronic transactions.
- Legal recognition to digital signature
- Facilitate electronic filing of documents.
- Facilitate electronic storage of data
- Facilitate EFTs
- Recognition to books of account in electronic form

Scope of this Act

Extend to all over India and also to any offence committed thereunder outside India.

Definitions

Asymmetric Crypto System

Key Pair consisting of a private key (for creating digital signature) and a public key (to verify the digital signature).

Digital Signature

Authentication of electronic record by means of an electronic method.

Secure System {Hardware, Software & Procedure}

- ✓ Is secure from unauthorized access
- ✓ Provide a reasonable level of reliability
- ✓ Suited in performing the intended functions.
- ✓ Adhere to generally accepted security procedures.

Power of CG to make rules in respect of digital signature

1. Type of digital signature
2. Manner and format for affixing it.
3. Manner & procedure to identify the originator.
4. Control procedures to ensure security & confidentiality.
5. Any other matter to give legal effect to digital signature.

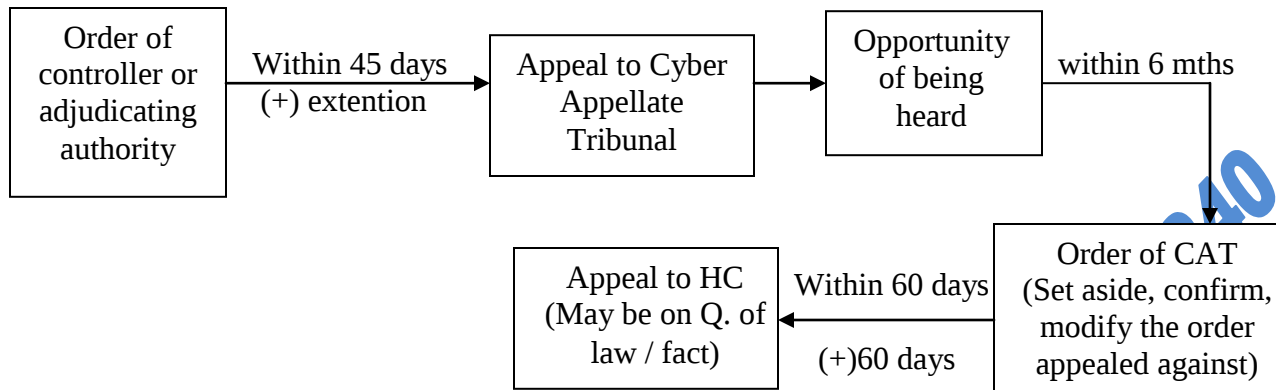


Damage to Computer, Computer system, Computer network, Computer hardware etc.

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> ➤ Accesses or secures access to ➤ Downloads or copies any data from such ➤ Introduces or causes to introduce any virus into the ➤ Damages or causes to damage any ➤ Denies or causes denial access to such ➤ Provides assistance to access to ➤ Tampering or manipulating | } | <p>Computer
Computer System
Computer Network
Computer Resource etc.
(Compensation upto Rs. 1 Cr.)</p> |
|---|---|---|

Penalties

- | | |
|----------------------------------|---|
| ➤ Failure to furnish information | upto Rs.1.5 lakh for each failure |
| ➤ Failure to file return | upto Rs.5000/- per day |
| ➤ Failure to maintain books | upto Rs.10000/- per day |
| ➤ Hacking with computer system | upto 2 lakhs/imprisonment upto 3yrs./both |
| ➤ Misrepresentation | upto 1 lakh/imprisonment upto 2yrs/both |
| ➤ Breach of confidentiality | upto 1 lakh/imprisonment upto 2yrs/both |

Compounding of offences

- Either before or after institution of adjudication
- Compounded by Controller or Adjudicating Officer
- Similar contravention can not be compounded within 3 yrs.

Power of CG to make rules (Sec 87)

- By notification in the official gazette and in the electronic gazette
- Matters to be specified in the rules
 - ✓ Manner of authentication by means of digital signature
 - ✓ Electronic form of filing, issue, payment etc.
 - ✓ Type and manner of affixing digital signature.
 - ✓ Qualification, disqualification and terms & conditions of service of controller etc.
 - ✓ Standards to be observed by controller
 - ✓ Form and manner of application for license.
 - ✓ Form for application for issue of digital certificate. etc.

Steps to create Digital Signature

- Electronic record is converted into "Message Digest" using mathematical function known as "Hash Function" which freezes the electronic record.
- Private Key attaches itself to the message digest.

Liabilities of Companies

- Every person who was in-charge / responsible for day-to-day activity & the company shall be deemed to be guilty of such offense & shall be liable to be punished & proceeded against.
- Every Manager, Director, Officer with whose connivance such offense was committed shall also be liable.
- No liability if he proves his innocence.

➔ Controller shall act as repository for all digital signatures issued under this act.

Chapter-17

Audit of Information Systems

IS Auditor must ensure that provisions are made for:

- | | |
|--------------------------------------|---|
| ➤ An adequate audit trail | ➤ Govt. policies & procedures are adhered |
| ➤ Control over the accounting | ➤ Training |
| ➤ Handling exceptions | ➤ Evaluation criteria of system |
| ➤ Testing | ➤ Adequate control over the network |
| ➤ Control over changes to the system | ➤ Adequate security procedures |
| ➤ Authorization procedures | ➤ Back up & recovery procedures |

Computer auditing approach different from manual auditing

- Electronic evidence
- Computer terminology
- Automated processes
- Exposed to new risks
- Reliance on adequacy of controls

Scope & Objectives of IS Audit

- Computerised system & applications
- Information processing facilities
- System development
- Management of IS
- Client/server, telecommunications, and intranets

Computer Security

- Accidental/Intentional damage, unauthorised access, modification, theft etc.
- Control procedures to prevent fraud (antivirus, encryption, firewalls, back up & recovery)
- Complete review of the entire system & procedures
- Test of controls & ensuring proper implementation
- Rectification of security weaknesses

Program development, acquisition & modification

- Reviewing the existing internal control & its evaluation.
- Reviewing the reasons for such development/modification
- Analysis of system specifications.
- Interviewing development personnel, managers & users
- Identifying unauthorised instructions (reprocessing & parallel simulation techniques)
Parallel Simulation Technique (Source Code Comparison) – Compares the current source code with the original one to detect unauthorized modification.
- Ascertaining that programs are properly tested.
- Thorough review of all the documentation

Audit of Computer processing

- Understand & evaluate the processing controls.
- Ensure that they are practically followed
- Periodical review of all the controls
- Elimination of control deficiencies.

- Test data processing – Processes a series of correct & incorrect data and reverse the effect of test data after auditing.

Concurrent Audit Techniques

(Continuous monitoring of system and input on a real time basis)

1. Integrated test facility (fictitious records) – No need to reverse the test transactions & the user is unaware of this process of testing.
2. Snapshot Technique – Snapshot data is stored in a separate file & is reviewed by auditor
3. System control audit review file (SCARF) – Collects data of special transactions e.g. exceeding certain amount.
4. Audit hooks – Flag suspicious transactions & display a message at the auditor's terminal
5. Continuous and Intermittent Simulation – This audit module works along with the DBMS like SCARF. It does parallel simulation & reports the discrepancy through a separate log file.

Analysis of Program logic

(Time consuming & require programming language proficiency)

1. Automated flowcharting programs (Automatically generates flow-chart from source code)
2. Automated decision table programs

Source Data Controls

- Detection of inaccurate & unauthorised source data.
- Input control matrix (control applied to each field of input data)
- Periodical review of control procedures to maintain effectiveness

Data Files Controls

- Data storage risk (access, modification, destruction)
- Audit procedures checklist

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Chapter-3 Basic Concepts of MIS

Management	Information	System
→ Determining the objectives → Developing plans → Securing & organizing various resources → Exercising adequate controls → Monitoring the results	→ Reprocessing of data & putting them into a meaningful & useful context	→ Consisting of a no. of elements operating together for accomplishment of an objective.

- ⇒ **MIS** is a network of information that supports management decision making.
- ⇒ It uses the information resource for effective & better achievement of organizational objectives.
- ⇒ Canith defines “MIS as an approach that visualize the organisation as a single entity composed of various inter-related and inter-dependent sub-systems to provide timely & accurate information for management decision making.

Characteristics of an effective MIS

1. *Management oriented* [Development of MIS starts from the need of the management]
2. *Management directed* [management actively directs the MIS development]
3. *Integrated* [all the information sub-system works as a single entity]
4. *Common Data Flow* [common input, processing & output procedures & media]
5. *Heavy planning element* [consumes substantial time to develop]
6. *Sub-system concept* [entire MIS is divided into smaller sub-systems]
7. *Common Database*
8. *Computerized*

Misconceptions about MIS [and their clarifications]

1. MIS is about the use of computers [it may or may not involve computers]
2. More data in reports means better information for managers [quality of data and not the quantity of data is relevant]
3. Accuracy in reporting is of vital importance [Information may be approximate. Accurate information involves higher cost]

Pre-requisites of MIS

- i. Database and DBMS
- ii. Qualified system & staff
- iii. Support of top management
- iv. Adequate control & maintenance of MIS
- v. Evaluation of MIS

Constraints in operating MIS

- i. Non availability of experts
- ii. Difficulty in dividing MIS into sub-systems
- iii. MIS is non standardized
- iv. Non co-operation from staff
- v. Difficult to quantify the benefits of MIS

Effects of using computer MIS

- i. Speed in information processing & retrieval
- ii. Increases the usefulness of information system
- iii. Scope of analysis widened
- iv. Complexity of system design & operation
- v. Integration of different information sub-system

Limitations of MIS

- i. Effectiveness of MIS depends upon the quality of input
- ii. Not a substitute of effective management
- iii. MIS lacks flexibility
- iv. Ignores the non quantitative factors (attitude & morale)
- v. Useless for non programmed decisions
- vi. Difficult to maintain privacy & secrecy

Types of information

Environmental Information	Competitive Information	Internal Information
→ Govt. policies → Factors of production → Technological information → Economic trend	→ Industry demand → Firm demand → Competitive data	→ Sales forecast → Financial budget → Supplier factors → Internal policies

Levels of management & their information requirement

Top Level (Strategic Level)	Middle Level (Tactical Level)	Supervisory Level
→ Determining the overall goals & objectives → Economic / political / social information → Competitive information	→ Sales Manager, Purchase Manager, Finance Manager → Most of the information is internal → Demand & supply information	→ Section officers, Foreman → Instruct and supervise employees → Make routine & day to day decisions.

Database

It is a super-file that consolidates & integrates the data that was previously stored in different files.

Chapter - 4

Systems Approach & Decision Making

System Approach to Management

- ⇒ It's a way of thinking about management problems.
- ⇒ Each problem should be examined in its entirety and effect of the proposed changes to each part of the organization e.g. changing from batch production to continuous production will affect finance, warehousing, purchase department, etc.

Decision-Making

- ⇒ It is a never-ending process of choosing a particular course of action out of several alternative courses for achievement of desired goals.
- ⇒ Pre-decisional, decisional & post-decisional functions are performed by management.

Steps involved in decision making

1. Defining the problem
2. Analyzing the reasons
3. Identifying the alternative solutions
4. Evaluation of the same
5. Selection of the best alternative
6. Implementation of the solution

Classification of decisions

1. Programmed & non-programmed decisions
2. Strategic & tactical decisions
3. Individual & group decisions

Functional Information Areas

Finance & Accounting	Production	Marketing	Personnel
Financial decision making involves decision regarding procurement & effective utilization of funds. - Estimation of funds & the timing. - Capital structure. (Optimum Mix) - Capital budgeting (Investment) - Profit planning - Tax management - Working capital management - Current Assets management.	- Production Planning - Production Control - Material requirement planning (MRP) Production Planning = What to produce + When to produce + How to produce.	Marketing bridges the gap between the firm & its customers. - Sales support & analysis. - Market research & intelligence. - Advertising & promotion. - Product development & planning. - Product pricing - Customer service <u>3 types of information</u> - Internal - Competitive - Environmental	- Proper recruitment - Placement - Training - Compensation - Maintenance - Health & Safety <u>Sources of information</u> - Accounting information system - Payroll processing

Chapter - 5**Decision Support & Executive Information System****Decision Support System**

- ⇒ It is a system that provides tools to managers to assist them in solving semi-structured & unstructured problems (it is not a means to replace the management).
- ⇒ Programmed Decision System replace human decision making (no management is involved).

Properties of DSS

1. Support semi-structured & unstructured decisions
2. Ability to adapt the changing needs
3. Ease of learning & use

Components of DSS

1. Users (Managers)
2. Databases
3. Planning Languages (General purpose, special purpose)
4. Model Base (Brain of the DSS, custom developed)

Tools of DSS

- | | | |
|---|---|--|
| <ol style="list-style-type: none"> 1. Data based software 2. Model based software 3. Statistical software 4. Display based software | } | Integrated Tools combines all these software in one package. |
|---|---|--|

DSS in Accounting

1. Cost Accounting System (Generally used in Health Care industry)
2. Capital Budgeting System (Calculates NPV, IRR of various projects)
3. Budget Variance Analysis System (Forecasting budget & analyzing variances)
4. General Decision Support System, etc.

Executive Information System

- ⇒ It is a DSS designed to meet the special needs of top-level management and having additional capabilities such as e-mail.
- ⇒ It provides on-line access to information in a useful & navigable format (mouse & touch screen driven, pictorial & graphical presentation).
- ⇒ Types of planning by top level management
 - (i) Strategic Planning (CEO level)
 - (ii) Tactical Planning (Planning to carry out Strategic Planning)
 - (iii) Fire Fighting (Major damage, new competitor, strike)
 - (iv) Control (General controls)
- ⇒ Characteristics of Information obtained in EIS

(i) Unstructured	(iv) Informal Source
(ii) High degree of uncertainty	(v) Lack of details
(iii) Future Orientation (Economic trend, govt. decision, consumer choice, competitor, etc.)	

Chapter - 1

Basic concepts of systems

- **System** is a set of inter-related elements that operate collectively to accomplish some common goal.
- **Abstract System** is an orderly arrangement of independent ideas or constructs.
- **Physical System** consists of physical elements rather than ideas.
- It is a collection of elements that surround the system and often interact with the system.
- The features that define and delineate a system form its **boundary**.
- **Sub-system** is a part of larger system.
- Inter-connections & interactions between the sub-systems are called **interfaces**.
- **Decomposition** is the process of dividing a system into sub-systems and so on.
- **Simplification** is the process of organizing sub-system to simplify their inter-connections (clusters of sub-systems are established).
- **Supra-system** is an entity formed by a system / sub-system and its related systems / sub-system



Types of Systems

- ⇒ Deterministic System (Computer Program)
 - ✓ Operates in a predictable manner
 - ✓ Interaction among the parts is known with certainty
- ⇒ Probabilistic system (Inventory System)
 - ✓ Describe in terms of probable behaviour
 - ✓ Certain degree of error is always attached
- ⇒ Closed system
 - ✓ No interaction across its boundary.
 - ✓ Relatively closed system (it is a closed but not completely closed system in the physics sense).
- ⇒ Open System (Organisation)
 - ✓ Actively interacts with other systems
 - ✓ Tend to change to survive and grow due to change in external environment.

System Entropy

- System Entropy means decay, disorder or dis-organisation of a system.
- Negative entropy is the process of preventing entropy by input of matter, repair, replenish & maintenance.

System Stress & System Change

- A stress is a force transmitted by a system's supra-system that causes a system to change.
- It arises due to 2 reasons :- Change in the goal & Change in the achievement level.
- Systems accommodate stress through structural changes or process changes.

Information

- ⇒ Information is data that have been put into a meaningful & useful context.

⇒ Characteristics

- (i) Timeliness
- (ii) Purposeful
- (iii) Mode and Format (visual, verbal or written)
- (iv) Redundancy
- (v) Rate of transmission (bits per minute)
- (vi) Frequency (daily, weekly, or monthly)
- (vii) Completeness
- (viii) Reliability
- (ix) Cost-Benefit Analysis

Business Information System

- Transaction Processing System
- Management Information System
- Decision Support System
- Executive Information System
- Expert System (Artificial Intelligence) – It replace the need for human expertise. It is useful for a specific area e.g. taxation problem, refinery, etc.

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Chapter - 2

Transaction Processing System

- ⇒ Captures data and information reporting
- ⇒ [Simplification of information processing by clustering business transactions](#)
 - a) Revenue cycle
 - b) Expenditure cycle
 - c) Production cycle
 - d) Finance cycle

Components of transaction processing system

1. Input
2. Processing (on-line processing, batch processing)
3. Storage
4. Output

Types of codes used in transaction processing system

1. Mnemonic Codes
2. Sequence Codes
3. Block Codes
4. Group Codes

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SUMMARY OF MICS

Starting Your Preparation for MICS:

If you are starting your preparation for MICS, high importance wise chapter in exam is given below:

1. System Development Process (Ch7)
2. System Design (Ch 8)
3. System Acquisition S/W Development & Testing(Ch 9)
4. System Implementation & Maintenance (Ch 10)
5. EDP General Controls (Ch 13)
6. EDP Application Controls (Ch 14)
7. Computer Frauds (Ch 15)
8. Cyber Laws (Ch 16)
9. Audit of Information System (Ch17)
10. Information Security (Ch 18)
11. MIS
12. Design of Computerised Commercial Applications (Ch 11)
13. Enabling Technologies (Ch 6)
14. Decision Support System (Ch 5)
15. CASE Tools (Ch 19)
16. ERP (Ch 12)
17. Basic Concept of Systems (Ch1)
18. System Approach & Decision Making(Ch 4)

Chapter wise important point summary for ready reference at the time of Examination.

Basic Concept of System

1. Type of System

- (1) Deterministic and Probabilistic System.
- (2) Closed and Open System.

2. Characteristics of Information

- (1) Timeliness
- (2) Purpose
- (3) Mode and Format
- (4) Redundancy
- (5) Rate
- (6) Frequency
- (7) Completeness
- (8) Reliability
- (9) Cost Benefit Analysis
- (10) Validity
- (11) Quality

3. Categories of Information Systems

- (1) Transaction Processing System (TPS)
- (2) Management Information System (MIS)
- (3) Decision Support System (DSS)
- (4) Executive Information System (EIS)
- (5) Expert Systems (ES)

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Transaction Processing System

1. TransactionProcessingCycle

1. Revenue Cycle
2. Expenditure Cycle
3. Production Cycle
4. Finance Cycle

2. ComponentsoftheTransactionProcessingSystem

- 1 Inputs
- 2 Processing
- 3 Computer Storage
- 4 Computer Processing
- 5 Reference of Table File
- 6 Outputs

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Basic Concept of MIS

1. Characteristic of an effective MIS

1. Management Oriented
2. Management Directed
3. Integrated
4. Common Data Flows
5. Heavy Planning Element
6. Sub System Concept
7. Common Database
8. Computerised

2. Misconception or Myths about MIS

1. The study of management information system is about the use of computers.
2. More data in reports means more information for managers.
3. Accuracy in reporting is of vital importance

3. Pre-Requisites of an effective MIS

1. Database
2. Qualified system and management staff
3. Support of Top Management
4. Control and maintenance of MIS
5. Evaluation of MIS

4. Constraints in Operating a MIS

1. Non availability of Experts
2. Problem of selecting the sub-system
3. Varied objectives of business concerns
4. Non availability of Co-operation from staff
5. High turnover of Experts
6. Difficulty in Quantifying the benefit of MIS

5. Effects of using Computer for MIS

1. Speed of processing and retrieval of data increases
2. Scope of use of information system has expanded
3. Scope of analysis widened
4. Complexity of system design and operation increased
5. Integrates the working of different information sub-system
6. Increase the effectiveness of Information system
7. More comprehensive Information

6. Limitations of MIS

1. Quantity of Input and Processing
2. Not substitute for effective management only alternate tools for decision making
3. Not have requisite flexibility to quickly update itself
4. Can not provide tailor made information package
5. Ignore non-quantitative factors
6. Less useful for making non-programmed decisions
7. Less useful for non sharing culture organisations
8. Effectiveness decreases due to frequent changes in top-management, organizational structure and operation team

7. Establishing information requirement

1. Environment information (i)
Government Policy (ii)
Factors of Production
(iii) Technological Environment
(iv) Economic Trends
2. Competitive information
(i) Industry demand (ii)
Firm demand
(iii) The Competitive Data
3. Internal information
(i) Sales Forecast
(ii) Financial Plan/Budget
(iii) Supply Factors
(iv) Internal Policies

8. Factor on which information requirements depend

1. Operational Function
2. Type of decision making
(i) Programmed decisions
(ii) Non-Programmed decision
3. Level of management activity
(i) Strategic Level
(ii) Tactical Level
(iii) Supervisory Level

9. Level of Management

1. Top Level (Strategic Level)
2. Middle Level (Tactical Level)
3. Supervisory Level

System approach and Decision Making

1. Step in the process of decision making

1. Defining of the problem
2. Gathering and analysing data concerning the problem
3. Identification of alternative solution
4. Evaluation of alternative solution
5. Selection of the best alternative
6. Implementation of the solution

2. Classification of Decisions

1. Programmed and non-programmed decisions
2. Strategic and Tactical decisions
3. Individual and Group decision

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Decision Support and Executive Information Systems

1. Character of decision support system (DSS)

1. Semi structured and Un structured Decisions
2. Ability to adapt to changing needs
3. Easy to use

2. Components of Decision Support Systems (DSS)

1. The users
2. Databases
3. Planning Languages
4. Model Base

3. Tools of Decision Support Systems (DSS)

- (1) Data-based Software
- (2) Model Based Software
- (3) Statistical Software
- (4) Display Based Software

4. Characteristics of the types of information used in executive decision

- (1) Lack of Structure
- (2) High degree of uncertainty
- (3) Future Orientation
- (4) Informal source
- (5) Low Level of Detail

5. Purpose of Executive Information System

1. Support Managerial Learning
2. Timely access to information
3. Ability to direct management attention to specific areas

Enabling Technologies

1. Traditional Computing Model

1. Mainframe Architecture
2. Personal Computers
3. File Sharing Architecture
4. Client Server Model

2. Benefit of the Client/Server Technology

1. Easier work
2. Reduction of Cost
3. Increase Productivity
4. End User Productivity
5. Developer Productivity
6. Less person required for maintain
7. Less expenses in Hardware
8. Increase in Efficiency
9. Reduction in cost of purchasing, installing and upgrading software programs
10. Increase in Management control
11. Easier to implement
12. Long term cost benefits for development and support

3. Characteristic of Client/Server Technology

1. Consist of Client and Server process
2. Client and Server portion can operate on separate computer platforms
3. Any platform can be upgraded without having to upgrade the other platform
4. Server is able to service multiple clients or vice versa
5. Capability of networking
6. Significant portion of the application logic resides at the client end
7. Action is usually initiated at the client end
8. GUI generally resides at the client end
9. SQL capability is present
10. Database server should provide data protection and security

4. Component of Client Server Architecture

1. Client
2. Server
3. Middleware
4. Fat-client or Fat-Server
5. Network

5. Control techniques to increase the security as per IS auditor requirement

1. Disabling the floppy disk drive
2. Diskless workstation
3. Network monitoring
4. Data encryption techniques
5. Authentication system should be introduced by entering username and password
6. Use of Smart Card
7. Use of Application controls

6. Risk of Client/Server

1. Technological Risks
2. Operational Risks
3. Economic Risks
4. Political Risks

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SystemDevelopmentProcess

1. ActivitiesofSystemDevelopmentLifeCycle

1. Preliminary Investigation
2. Requirements analysis or systems analysis
3. Design of System
4. Development of Software
5. Systems Testing
6. Implementation and Maintenance

2. ReasonforfailuresystemDevelopmentactivities

1. Lack of senior management support for and involvement in information system development
2. Shifting user needs
3. Development of Strategic system
4. New Technologies
5. Lack of Standard Project management and systems development methodologies
6. Overworked or under-trained development staff
7. Resistance to change
8. Lack of user participation
9. Inadequate testing and user training

3. ApproachestoSystemsDevelopment

1. Traditional Approach
2. Prototyping Approach
3. End user development approach
4. Top down Approach
5. Bottom up Approach
6. Systematic Approach for Development in small organizations

4. StepsforPrototypingApproach

1. Identify Information System Requirements
2. Develop the Initial Prototype
3. Test and Revise
4. Obtain User Signoff of the Approved Prototype

5. AdvantageofPrototypingApproach

1. Satisfaction of users' needs and requirements
2. Short Period required for development
3. Errors detected and eliminated early in the developmental process

6. Disadvantage of Prototyping Approach

1. More time required in experimenting with approach
2. Frequently testing required
3. Cause behavioral problems with system users

7. Stages in Topdown Approach

1. Analysis the objectives and goals of the organisation
2. Identify the function of the organisation
3. Ascertain the major activities, decisions and functions
4. Identify the information requirement for activities and decisions
5. Preparing specific information processing programs in detail and modules within these programs

8. System Development Life Cycle Methodology

1. Project divided into number of identifiable processes
2. Periodically deliverables should be produced and monitors the development process
3. Requirement of Higher authority participate in project
4. Testing before implementation
5. Training plan should be develop for user
6. Assess the effectiveness and efficiency before installing new system

9. Objectives of Preliminary Investigation

1. Clarify and understand the project request
2. Determine the size of the project
3. Technical and Operational feasibility
4. Assess cost and benefits of alternative approaches
5. Report findings to the management

10. Preliminary Investigation methodology/process

1. Conducting the Investigation
2. Identifying Viable Option
3. Testing Project's Feasibility
4. Estimating Costs and Benefits
5. Reporting Results to Management

11. Methods of Investigation

1. Reviewing internal documents
2. Conducting interviews

12. Types of Project's Feasibility

1. Technical Feasibility
2. Economic Feasibility
3. Operational Feasibility
4. Schedule Feasibility
5. Legal Feasibility

13. Types of Cost in Cost-benefit analysis

1. Development Cost
2. Operational Cost
3. Intangible Cost

14. Fact-finding techniques for systems analysis

1. Documents
2. Questionnaires
3. Interviews
4. Observation

15. Methods of analysis of present system by the System Analyst

1. Review Historical Aspects
2. Analysis inputs
3. Review data files maintained
4. Review methods, procedures and data communications
5. Analyse outputs
6. Review internal controls
7. Model the existing physical system and logical system
8. Undertake overall analysis of present system

16. Tools for System Development

1. System components and flows
2. User interface
3. Data attributes and relationships
4. Detailed system process

SystemDesign

1. AreasofNewSystemDesign

1. Output
2. Input
3. Processing
4. Storage
5. Procedures
6. Personnel

2. ImportantfactorsinOutputdesign

1. Content
2. Form
3. Output Volume
4. Timeliness
5. Media
6. Format

3. Variousmethodsofpresentoutputinformation

1. Tabular Format
2. Graphic Format

4. Guidelinesfordesigningprintedoutput

1. Read from left to right and top to bottom
2. Items should be easiest to find
3. Printed report should include heading, title of report, page number, etc
4. Related data should be grouped together
5. Control breaks should be used to find critical information
6. Sufficient margin should be made on page
7. Detail line for variable data should be defined
8. Mock up reports should be reviewed

5. ImportantfactorsforInputDesign

1. Content
2. Timeliness
3. Media
4. Format
5. Input Volume

6. Guidelines for form Input design

1. Making forms easy to fill
 - (i) Form Flow
 - (ii) Divide forms in logical sections
 - (iii) Filled Template
 - (iv) Captioning
2. Meeting the intended purpose
3. Ensuring accurate completion
4. Keeping forms attractive

7. Coding methods for Input Design

1. Individuality
2. Space
3. Convenience
4. Expandability
5. Suggestiveness
6. Permanence

8. Coding Scheme for Input Design

1. Classification Codes
2. Function Codes
3. Significant-digit subset codes
4. Mnemonic Codes
5. Hierarchical Classification

9. Contents of System Manual

1. General Description of the existing system
2. Flow of existing system
3. Output of the existing system
4. General description of the new system
5. Flow of the new system
6. Output layout
7. Output distribution
8. Input layouts
9. Input responsibility
10. Macro-logic
11. Files to be maintained
12. List of Programs
13. Timing estimates
14. Controls
15. Audit Trail

System's Acquisition Software Development and Testing

1. Important points for selecting a computer system

1. Latest possible technology
2. Capability of Storage peripherals
3. Software Package
4. Compare same series computer
5. Vendor and machine section

2. Advantage of Buying Software/Pre-written application package

1. Rapid Implementation
2. Low Risk
3. Quality
4. Cost

3. Factors for validation of Vendors proposal evaluation

1. The performance Capability
2. The cost and benefit analysis
3. The Maintainability
4. The Compatibility
5. Vendor Support

4. Methods for Validation the vendors proposal

1. Checklists
2. Point-Scoring Analysis
3. Public evaluation reports

5. Stages for Software Development

1. Program Analysis
2. Program Design
3. Program Coding
4. Debug the program
 - (i) Use Structure walkthroughs
 - (ii) Test the program
 - (iii) Review the program code for adherence to standards
5. Program documentation
6. Program maintenance

6. Tools for Program Design

1. Program flow Chart
2. Pseudo Code
3. Structure Chart
4. 4GL Tools
5. Object oriented programming and design tools

7. Pre-requisiteforsystemtesting

1. Preparing realistic test data
2. Processing Test date
3. Through checking of the results
4. Reviewing the results

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System Implementation and Maintenance

1. Steps for Equipment Installation

1. Site Preparation
2. Equipment Installation
3. Equipment check out

2. Strategies for converting from the old system to the new system

1. Direct Change over
2. Parallel conversion
3. Gradual Conversion
4. Modular prototype conversion
5. Distributed conversion

3. Fundamentally activities before conversion of previous system to new information system

1. Procedure Conversion
2. File Conversion
3. System Conversion
4. Scheduling Personnel and equipment
5. Alternative plans in case of equipment failure

4. Types of evaluation of the new system

1. Development evaluation
2. Operation Evaluation
3. Information Evaluation

5. Category of System Maintenance

1. Schedule maintenance
2. Recue maintenance

EnterpriseResourcePlanning:redesigningBusiness

1. CharacteristicsofERP

1. Flexibility
2. Modular & Open
3. Comprehensive
4. Beyond the Company
5. Best Business Practices

2. FeaturesofERP

1. ERP provided muliti-facility
2. Support Planning
3. End to end supply chain management
4. Company-wide integrated information system
5. Increase Corporate Goodwill
6. Became bridge the information gap across organisations
7. Integration of system
8. Solution for better project management
9. Allows automatic introduction of the latest technologies
10. Eliminates problem
11. Provides intelligent business tools

3. BenefitsofERP

1. Gives better business control
2. Reduce paper work
3. Improve timeliness
4. Faster customer response
5. Better monitoring and quicker resolution of queries
6. Quick response to changing market conditions
7. Competitive Advantage
8. Improve Supply-demand linkage
9. Improve international business
10. Better access of Management Information

4. MethodologyforERPImplementation

1. Indentifying the needs
2. Evaluation ERP
3. Deciding
4. Reengineering the business process
5. Evaluation various ERP Package
6. Finalising most suitable ERP Package
7. Installing the required hardware and software
8. Finalising consultants
9. Implementing the ERP Package

5. Criteria for evaluation various ERP package

1. Flexibility
2. Comprehensive
3. Integrated
4. Beyond the company
5. Best business practices
6. New technologies

6. Guidelines for ERP Implementation

1. Understanding the corporate needs and culture of the organization
2. Process redesign exercise
3. Establish good communication network
4. Provide strong and effective leadership
5. Finding an efficient and capable project manager
6. Creating a balanced team
7. Selecting a good implementation methodology
8. Training end user
9. Making the required changes in the working environment

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Controls in EDP Set-Up: General Controls

1. Types of Controls in a Computer-Based System

1. General Controls
2. Application Controls

2. Objectives of Operating System Controls

1. Protect itself from users
2. Protect users from each other
3. Protect users from themselves
4. Protected from itself
5. Protected from its environment

3. Security Components for Operating System

1. Logon Procedure
2. Access Token
3. Access Control List
4. Discretionary Access Control

4. Threats to Operating System Integrity

1. Accidental Threats
2. Intentional Threats

5. Controlling Access Privileges for Operating System

1. Password Control
2. Reusable Passwords
3. One-time Passwords

6. List of Common Types of Destructive Programs in Operating System

1. Virus
2. Worm
3. Logic Bomb
4. Back Door
5. Trojan Horse

7. Objectives of Audit Trail to Support Security in Operating System

1. Detecting Unauthorized Access
2. Reconstructing Events
3. Personal Accountability

8. List of Several database control features

1. User View
2. Database Authorization Table
3. User-Defined Procedures
4. Data Encryption
5. Biometric Devices

9. List controls in Organization Structure

1. Separating systems development from computers operations
2. Separating the database Administrator from other Functions
3. Separating New Systems Development from Maintenance
4. An Alternative Structure for Systems Development
5. Separating the Data Library from Operations

10. Activities of System development Controls

1. System Authorization Activities
2. User Specification Activities
3. Technical Design Activates
4. Internal Audit Participation
5. Program Testing
6. User Test and Acceptance Procedures

11. Activities of system Maintenance Controls

1. Maintenance Authorisation, Testing and Documentation
2. Source Program Library Controls
3. Audit Trail and Management Report
4. Program Version Number
5. Controlling Access to Maintenance Commands
6. Message Sequence Numbering

12. Various tools which damage Computer Centre Security

1. Fire Damage
2. Water Damage
3. Energy Variations
4. Pollution damage
5. Unauthorized Intrusion

13. List of major features of well designed fire protection system

1. Automatic and manual Fire alarm
2. Fire System
3. Manual Fire Extinguisher at strategic location
4. Control Panel
5. Master Switches installed
6. Building may be constructed from fire resistant materials
7. Fire Extinguishers and Fire Exits should be marked clearly

8. Automated system should be installed to inform fire station
9. Experienced Security Office should be deployed

14. ComponentsofDisasterRecoveryPlan

1. Emergency Plan
2. Recovery Plan
3. Backup Plan
4. Test Plan

15. ToolsforControllingriskfromSubversiveThreats

1. Firewalls
 - (i) Networks-Level Firewalls
 - (ii) Application-level firewall
2. Controlling Denial of Service attacks
3. Encryption
 - (i) Private Key Encryption
 - (ii) Public Key Encryption
4. Message Transaction Log
5. Call Back Devices

16. InherentProblemsofPersonalComputersandtheControls

1. Weak Access control
2. Multilevel Password Control
3. Inadequate Backup Procedure

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Controls in EDP Set-UP: Application Controls

1. Classes of Input Control

1. Source Document Controls
2. Data Coding Controls
3. Batch Controls
4. Input error Correction
5. Generalized data input systems

2. Control List for Source Document

1. Use Pre numbered Source Documents
2. Use Source Documents in Sequence
3. Periodically Audit source Documents

3. Types of Error

1. Transcription Error (i)
Addition Error (ii)
Truncation Error
(iii) Substitution Error
2. Transposition Error

4. Levels of Input Validation Controls

1. Field Interrogation
2. Record Interrogation
3. File Interrogation

5. Common Type of Field Interrogation

1. Limit Checks
2. Picture Checks
3. Valid Code Checks
4. Check Digit
5. Arithmetic Checks
6. Cross Checks

6. Common Type of Record Interrogation

1. Sequence Checks
2. Format Completeness Checks
3. Combination Checks
4. Passwords

7. Common Type of File Interrogation

1. Internal Label Checks
2. Version Checks
3. An Expiration Date Checks

8. Common error-handling technique for input error correction

1. Immediate Correction
2. Create an error file
3. Reject the entire batch

9. Categories of Processing Controls

1. Run-to-Run Controls
2. Operator Intervention controls
3. Audit Trail Controls

10. Techniques to preserve audit trails in Computer Based Information System

1. Transaction Logs
2. Transaction Listing
3. Log of Automatic Transactions
4. Listing of Automatic Transactions
5. Unique Transaction Identifiers
6. Error Listing

11. Type of Output Control

1. Tape and Disk Output Controls
2. Printed Output Controls

12. Techniques of Output controls for printed output

1. Verification of Output
2. Distribution of Output
3. Procedures for acting on exception reports

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Detection of Computer Frauds

1. Computers frauds include following activity

1. Clearly recognizable frauds
2. Hacking
3. Manipulation of computer system
4. Theft or destruction of confidential and sensitive information
5. Abuse of computer systems by employees
6. software piracy

2. Data Processing model fraud

1. Input
2. Processor
3. Computer Instruction
4. Data
5. Output
6. Malicious alterations of email

3. Different ways of Internet Fraud

1. It is unregulated
2. Low Cost and can be set up anywhere in India
3. An impressive site
4. Glamour and novelty
5. May operate outside the legal jurisdiction

4. Reason for not know how many companies loosed because of Computer Fraud

1. Not everyone agrees on what constitute computer fraud
2. Many computers frauds go undetected
3. Frauds are not reported
4. Most networks have a low level of security
5. Many internet pages give step by step instruction on how to perpetrate computer frauds and abuses
6. Law enforcement is unable to keep up with the growing number of computer frauds.

5. Precaution/ measures for decrease the computer frauds

1. Make Fraud Less Likely to Occur
2. Use Proper Hiring and Firing Practices
3. Manage Disgruntled Employees
4. Train Employees in Security and Fraud Prevention Measures
5. Security measures
6. Telephone disclosures
7. Fraud awareness
8. Ethical considerations

9. Punishment for unethical behavior
10. Educating employees in security issue
11. Manage and Track Software Licenses
12. Required Signed Confidentiality Agreements

6. DifferentwaytocontrolComputerfraud

1. Develop a Strong System of Internal Controls
2. Segregate Duties
3. Require Vacations and Rotate Duties
4. Restrict Access to Computer Equipment and Data Files
5. Encrypt Data and Programs
6. Protect Telephone Lines
7. Protect the System from Viruses
8. Control Sensitive Data
9. Control Laptop Computers

7. StepstodetectComputerFraud

1. Conduct Frequent Audit
2. Use a Computer Security Officer
3. Use Computer Consultants
4. Monitor System Activates
5. Use fraud detection software

8. MethodstoreduceComputerfraudLosses

1. Maintain Adequate Insurance
2. Keep a current backup copy
3. Develop a contingency plan
4. Use special software designed to monitor system activity

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CyberLawsandInformationTechnologyAct2000

1. ObjectivesofAct

1. To grant Legal Recognition for transaction
2. To give Legal Recognition to Digital Signature
3. To facilitate electronic filing of documents with Government
4. To facilitate electronic storage of data
5. To facilitate and give legal sanction to electronic fund transfer
6. To give legal recognition for keeping books of account by bankers
7. to amend the various Indian act

2. Areaswhereactshallnotapply

1. A negotiable Instrument
2. A trust
3. A will
4. Any contract for the sale or conveyance of immovable property
5. Any such class of documents or transactions

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Audit of Information Systems

1. Disadvantage of Computer Audit Approach

1. Electronic Evidence
2. Terminology
3. Automated Processes
4. New Risks and Controls
5. Reliance on Controls

2. Areas for review before starting of Information System (IS) audit

1. Computerised Systems and Applications
2. Information Processing Facilities
3. System Development
4. Management of Information systems
5. Client/Server, Telecommunications and Intranets

3. Framework for auditing computer security

1. Types of Security errors and Fraud faced by companies
2. Control Procedures to minimize security errors and fraud
3. Systems review audit procedures
4. Tests of controls audit procedures
5. Compensating Controls

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Information Security

1. Objective of Information Security

1. Information easily available and usable when required (Availability)
2. Data and information are disclosed only to those who have a right to know it (Confidentiality)
3. Data and Information are protected against unauthorized modification (Integrity)

2. Steps for establishing better information protection

1. Not all data has the same value
2. Know where the critical data resides
3. Develop an access control methodology
4. Protect information stored on media
5. Review hardcopy output

3. Core Principles of Security Objective

1. Accountability-Responsibility and accountability must be explicit
2. Awareness-Awareness of risks and security initiatives must be disseminated
3. Multidisciplinary-Security must be addressed taking into consideration both technological and non technological issues
4. Cost Effectiveness-Security must be cost effective
5. Integration-Security must be coordinated and integrated
6. Reassessment-Security must be reassessed periodically
7. Timeliness-Security procedures must provide for monitoring and timely response
8. Societal Factors- Ethics must be promoted by respecting the rights and interests of others.

4. Types of Protection for an Organization

1. Preventative Information Protection
2. Restorative Information Protection
3. Holistic Protection

Use of Simple CASE Tools, Analysis of Financial Statements using Digital Technology

1. Key components of Computer Aided Software Engineering (CASE) environments

1. Analysis Dimension
2. Development Dimension
3. Management Dimension
4. Support Dimension

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Exam Paper Analysis at a glance:

1. Compulsory Question

1. EDP General Controls (Ch 13)
2. EDP Application Controls (Ch 14)
3. Computer Frauds (Ch 15)
4. Cyber Laws (Ch 16)
5. Audit of Information System (Ch 17)
6. MIS (Ch.3)

2. Normal Questions with high value

1. System Development Process (Ch 7)
2. System Design (Ch 8)
3. System Acquisition S/W Development & Testing (Ch 9)
4. System Implementation & Maintenance (Ch 10)
5. Design of Computerised Commercial Applications (Ch 11)
6. Information Security (Ch 18)

3. Less Important Chapters

1. Basic Concept of Systems (Ch 1)
2. System Approach & Decision Making (Ch 4)
3. Decision Support System (Ch 5)
4. Enabling Technologies (Ch 6)
5. ERP (Ch 12)
6. CASE Tools (Ch 19)

4. Other points to remember

1. As per the analysis for last several exam papers Chapter 7 to Chapter 10 (System Development to System Maintenance) comes for nearly 40-45 marks.
2. Questions from Design of Computerised Commercial Applications (Ch 11).
This Question will always come directly from institute Module.
3. Do not leave MIS. Last few papers there is high weight around 15 Marks.
4. Also EDP General & EDP Application Controls comes for around 15-25 Marks and it mostly comes along with Fraud or System Chapters 7 to 10.

Question and Answer Zone

(47 Most IMP FAQ)

CHAPTER 1

Q-1 what is information and its characteristics?

Information is data that has been put into meaning full and useful context. A data processing system processes data to generate information. Information is the substance on which business decisions are based. Therefore, the quality of information determines the quality of action or decision.

Information is a basic resource in the modern society. Organizations spend most of their time generating, processing, creating, using, and distributing information. Information and information system are valuable organization resources that must be properly managed for the organization to succeed.

Information flows are as important to the survival of a business as the flow of blood is to the life and survival of an individual. Information flow is important for good business decisions and it has been often said that a receipt of business is, “90% information and 10% inspiration.”

Characteristics of information

The important characteristics of useful and effective information are as follows.

1. **Timeliness**- it is mere truism to say that information , to be any use, has to be timely. Time losses must be vary carefully watched on a daily and continous basis and analyzed to find means to minimize them, the MIS must be geared for this purpose. However, it is not always necessary that information is required at such a short interval. Usually, as we proceed from the lower levels to the higher levels of management, the time interval necessary for providing decision-important information on a routine or on a exception basis increases at a strategic level.
2. **Purpose**- information must have purpose. At the time it is transmitted a person or machine, otherwise it is a simple data. Information communicated to people has a variety of purposes, because of the variety of activities performed by the business organizations. The basic purpose of information is to information, evaluate , persuade and organize
3. **Mode and format**- the modes of communicating information to humans are sensory(through site, hear, taste, touch, smell) but in business they are either visual , verbal or in written form.

Format of information should be so designed that it assists in decision making, solving problems, initiating planning, controlling and searching. Therefore all the statistical rules of compiling statistical tables and presenting information by means of diagram, graphs, curves, etc, should be considered and appropriate one followed. The data should only be classified into those categories which have relevance to the problem at hand. Format of information

dissemination is a matter of imagination and perception. It should be simple and relevant, should highlight important points but should not be too cluttered up

4. **Redundancy**- it means the excess of information carried per unit of data. For example, 70% of letters used in a phrase usually redundant. However in a business situation redundancy sometime be necessary to safeguard against error in communication process. For example Correspondence in contracts may carry figure like “ 4” followed by four.
5. **Rate**- the rate of transmission/ reception of information may be represented by the time required to understand a particular situation. Quantitatively, the rate for humans may be measured by the number of characters per minutes, such a sales reports from district office. For machines the rate may be based on number of bids of information per character per unit of time.
6. **Frequency**- the frequency with which the information is transmitted or received affects its value. Financial repots prepared weekly may show so little changes that they have small value, where as monthly reports may indicate changes big enough to some problem and trends
7. **Completeness**- the information should be as complete as possible. With the complete information the manager is in a much better position to decide whether or not to undertake the venture
8. **Reliability**- in statistical surveys, for example, the information that is arrived at should have an indication at the confidence level. Even other wise also information should be reliable and external sources relied upon indicated.
9. **Cost benefit analysis**- the benefits that are derived from the information must justify the cost incurred in procuring information. The cost factor is not difficult to establish. In-fact the assessment of benefits is very subjective and its conversion into objective units of measurement is almost impossible. To solve this problem we can classify all the managerial statements into many categories with reference to the importance attached, say, (a) absolutely essential statements, (b) necessary statements, (c) normal statements, (d) extra statements.
10. **Validity**- it measures the closeness of information to the purpose which it purports to serve. For example, some productivity measure may not measure, for the given situation, what they are supposed to do e.g., the real rise or fall in productivity. The measure suiting the organization may have to be carefully selected or evolved
11. **Quality**- quality refers to correctness of information. Information is likely to be spoiled by the personal bias. For example, an over optimistic salesman may give rather too high estimates of sales. This problem, however, can be circumvented by maintaining salesman's estimates and actual sales and deflating or inflating the estimates in light of this.

Q-2 Differentiate between following :-

- i) Deterministic & probabilistic system

- ii) Open & closed systems
- iii) Sub-system & supra system

Ans. I)	Deterministic system	Probabilistic system
1.	Operates in predictable manner.	Operates in probable manner.
2.	Interacting among its subsystems can be anticipated without errors.	has a probable behavior that Can not be anticipated with out errors.
3.	E.g. a computer system	E.g. manual processing system, inventory system.

II)	Closed	Open
1.	An independent self contained system that does not interact with environment	actively interact with other systems and establish relation
2.	As it does not get feedback from environment hence tend to deteriorate.	aware of the environment Around and gets continuous feedback.
3.	E.g. some computer program	e.g. business organization

III) Subsystem :- a subsystem is part of a large system. Each system is composed of subsystems, which in turn are made up of other subsystems, each subsystem being delineated by its boundaries. The interconnections and interactions between the subsystems are termed interfaces.

Supra system :- a supra system refers to the entity formed by a system and other equivalent subsystems with which it interacts. For example an organization may be subdivide into numerous functional areas such as marketing finance etc. each of these functional areas can be viewed as a subsystem of a larger system. For example marketing may be viewed as a system that consists of elements such as market research, advertising etc collectively these elements in the marketing area may be viewed as making up the marketing supra system.

CHAPTER 2

Q-3 Write short note on transaction processing cycle? Explain also the four common cycles of business activity?

Ans. The term accounting information system includes the variety of activities associated with an organization's transaction processing cycles. Although no two organizations are identical, most experience similar types of economic events. These events generate various transactions. A transaction processing cycle organizes transactions by an organisation's business processes. The nature and types of tps varies, depending on the information needs of a specific organization. Nevertheless, most business organizations have in common, transactions that may be grouped according to 4 common cycles of business activity.

Four common cycles

1. **Revenue cycle** :- events related to the distribution of goods and services to other entities and the collection of related payments.
2. **Expenditure cycle** :- events related to the acquisition of goods and services from other entities and the settlement of related obligations.
3. **Production cycle** :- events related to the transformation of resources into goods and services.
4. **Finance cycle** :- events related to the acquisition and management of capital funds including cash.

The transaction cycle model of an organization includes a fifth cycle- the **financial reporting cycle**. The financial reporting cycle is not an operating cycle. It obtains accounting and operating data from the other cycles and processes these data in such a manner that financial reports may be prepared. The preparation of financial reports in accordance with generally accepted accounting principles requires many valuations and adjusting entries that do not directly result from exchanges. Depreciation and currency transactions are two common examples. Such activities are part of an organisation's financial reporting cycle.

Q-4 write short note on transaction processing system?

Ans :- the principle components of a TPS include inputs, processing, storage, and outputs. These components or elements are part of both manual and computerized systems.

i) **Input** source documents such as customer orders, sales slips, invoices, purchase orders and employee time cards are the physical evidence of inputs into the TPS

ii) **Processing** processing involves the use of journals and registers to provide a permanent and chronological record of inputs. The entries are done either by hand in simple manual systems or by a data entry operator using a pc. Journals are used to record financial accounting transacts and registers are used to record other types of data not directly related to accounting.

iii) **Storage** ledgers and file provide storage of data in both manual and computerized systems. The general ledger, the accounts/vouchers payable ledgers and the accounts receivable ledgers are the records of financial account. They provide summaries of a firm's financial accounting transactions. All accounting transactions must be reflected in the GL

iv) **Computer storage** a file is an organized collection of data. There are several types of files. A transaction file is a collection of input data. Transaction files usually contains data that are of temporary rather than permanent interest. By contrast, a master file contains data that are of a more permanent or continuing interest.

v) **Computer processing** when computers are used for processing, two different modes of processing accounting transactions are possible. These modes are batch processing and direct processing. Batch processing is conceptually very similar to a traditional manual accounting system.

vi) **Outputs** there is a wide variety of outputs from a tps. Any document generated in the system is an output . Some documents are both output and input(e.g. a customer invoice is an output from the order entry application system and also an input document to the customer). Other common outputs of a tps are the trial balance, financial reports, operational reports, pay cheques, bill of lading and voucher cheques (payments to vendor)

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CHAPTER 3

Q-5(i) Explain the pre-requisites of effective MIS
(ii) What are the major constraints in operating an MIS?

Ans. (i) MIS is an old management tool. It is being used by business managers as a means for better management and scientific decision making. However, it has attained new dimensions after the advent of computers. The main pre-requisites of an effective MIS are as follows :-

A) Database :- it can be defined as a superfile which consolidates data records formerly stored in many data files. The data in database is organized in such a way that accesses to the data is improved and redundancy is reduced. Normally, the database is sub-divided into the major information subsets needed to run a business.

these subsets are (a) customer and sale file (b) vendor file (c) personnel file (d) inventory file (e) gl accounting file.

the main characteristics of database in that each subsystem utilizes same data and information kept in the same file to satisfy its information needs.

the database is capable of meeting information requirements of its executives, which is necessary for planning, organizing and controlling the operations of the business concern. But, it has been observed that such a database meets the information needs of control to its optimum.

B) Qualified system & management staff : the second prerequisite of an effective mis is that it should be manned by qualified officers. These officers who are experts in the field should understand clearly the views of their fellow officers. For this, the organizational management base should comprise of two categories of officers vis.

1) systems and computer experts, 2) management experts

C) Support to top management : the MIS to be effective, should receive the full support of the top management. The reasons for this are as follows :-

1) subordinate managers are usually lethargic about activities, which do not receive the support of their superiors.

2) the resources involved in computer based information system are large and are growing larger in view of importance gained by mis.

D) Control and maintenance of MIS: control of the MIS means the operation of the system as it was designed to operate . Sometime, users develop their own procedures or shortcut methods to use the system, which reduces its effectiveness. To check such habits of users, the management at each level in organization should device. Checks for the information system control.

maintenance is closely related to control. There are times when the need to improve the system will be discovered. Formal methods for changing and documenting changes must be provided.

E) Evaluation of MIS : the evaluation of MIS should take into account the following points :-

1) examining whether enough flexibility exists in the system, to cope with any expected or unexpected information requirement in future.

2) ascertaining the views of users and the designers about the capabilities and deficiencies of the system.

3) guiding the appropriate authority about the steps to be taken to maintain effectiveness of MIS.

Ans (ii) constraints in operating a MIS : major constraints which come in the way of operating an information system are as follows :-

- a) Non-availability of experts, who can diagnose the objective of the organization and provide a desired direction for installing and operating system. This problem may be overcome by grooming internal staff. The grooming of staff should be preceded by proper selection & training.
- b) Experts usually face the problem of selecting the sub-system of MIS to be installed and operated upon. The criteria which should guide the experts here, may be the need and importance of information for which an MIS can be installed first.
- c) Due to varied objectives of business concerns, the approach adopted by experts for designing and implementing MIS is a non-standardized one. Though in this regard nothing can be done at the initial stage, but by and by standardization may be arrived at, for the organization in the same industry.
- d) Non-availability of co-operation from staff in-fact is a crucial problem. It should be handled tactfully. Educating the staff may solve this problem. This task should be carried out by organizing lectures, showing films and also explaining to them the utility of the system.
- e) There is high turnover of experts in MIS. Turnover in-fact arises due to several factors like pay packet, promotion chances, future prospects, behavior of top ranking officers etc. Turnover of experts can be reduced by creating better working conditions and paying at least at par with other similar concerns.
- f) Difficulty in quantifying the benefits of MIS, so that it can be easily comparable with cost. This raises questions by departmental managers about the utility of MIS. They forget that MIS is a tool, which is essential to fight out competition and the state of uncertainty that surrounds business today.

Q-6 Discuss the factors on which information requirements of executives depends?

Ans- the factors on which information requirements of executives depend are:

1. Operational function
 2. Types of decision making
 3. Level of management activity
1. **Operational Function**- the grouping or clustering of several functional units on the basis of related activities into a sub system is termed as operational function. For example, in a business enterprise, marketing is an operational function, as it is the clustering of several functional units like market research, advertising, sales analysis and so on. Like wise, production finance, personnel etc. can all be considered as operational functions.

2. **Types of decision making-** Organizational decision can be categorized as programmed and non-programmed ones.

Programmed decisions : Programmed decisions refer to decisions made on problems and situations by reference to a predetermined set of precedents, procedures, techniques and rules. These are well-structured in advance and are time tested for their validity. As a problem or issue for decision making emerges, the relevant pre-decided rule or procedure is applied to arrive at the decision. For example, in many organizations, there is a set procedure for receipt of material,

payment of bills, employment of clerical personnel, release of budgeted funds, and so on.

Non-programmed decisions : are those, which are, made on situations and problems which are novel and non-repetitive and about which not much knowledge and information are available. They are non programmed in the sense that they are made not by reference to any pre determined guidelines, standard operating procedures, precedents and rules but by application of managerial intelligence, experience, judgement and vision to tackling problems and situations, which arise infrequently and about which not much is known.

3. **Level of management activity** – Different levels of management activities in management planning and control hierarchy are strategic level, tactical level and operational level

Strategic Level-strategic level management is concerned with developing of organizational mission, objectives and strategies. Decision made at this level of organization to handle problems critical to the survival and success of the organization, are called strategic decisions. They have a vital impact on the direction and functioning of the organization-as for example decision on plant location, introduction of new products, making major new fund raising and investment operations, adoption of new technology, acquisition of outside enterprise and so on.

Tactical Level : Tactical level lies in the middle of management hierarchy. At this level, managers plan, organize, lead and control the activities of other managers. Decisions made at this level called the tactical decisions (which are also called operational decisions) are made to implement strategic decisions . A single strategic decision calls for a series of tactical decisions, which are of a relatively structured nature. Tactical decisions are relatively short, step-like spot solutions to breakdown strategic decisions into implementable packages.

Supervisory Level : This is the lowest level in managerial hierarchy. The managers at this level co-ordinate the work of others who are not themselves managers. They ensure that specific tasks are carried out effectively and efficiently.

CHAPTER 4

Q-7 Briefly discuss various functional Information system areas?

Ans- There are various users of information systems in business as there are number of activities to be performed in order to solve business problems. A business manager should have a general understanding of the major ways information system are used to support each of the functions of business. Managerial end users are required to make decisions in several areas viz. finance, production, marketing, personnel etc.

- 1. Finance and Accounting System-** Finance and accounting, as such are separate functions but are sufficiently related to be described together. Accounting covers the classification of financial transactions and summarization into the standard financial statements (profit and loss account and balance sheet). Finance system ensures adequate organizational financing at a low cost so as to maximize returns to shareholders (owners). It comprises of major functions such as granting of credit to customers, collection process, cash management, financing capital and so on.
- 2. Marketing System** – The marketing system is aimed at supporting the decision making, reporting and transactions processing requirement of marketing and sales management. The main objective of marketing management system is to develop, promote distribute, sell and service the products of the organization and return a profit that is enough to justify the existence of the organization. Marketing bridges the gaps between the business firms and its customers, by making available to the customers, the products of the firm.

The information that marketing management receives is important, however, the information that marketing generates is vital to the rest of the organization. Because of this, the impact of ineffective marketing information systems is felt throughout the organization. Even more important is marketing's role as a company's revenue generating branch.

The marketing information system must be designed to support a marketing management organization. It consists of following inter- related information sub systems to enhance the decisional capacities in various marketing activities.

- i) Sales
- ii) Market research and intelligence
- iii) Advertising and promotion
- iv) Production development and planning
- v) Production pricing system
- vi) Customer services

- 3. Production System-** One of the major areas in any kind of enterprise is production and operations management. Generally, production management is the term used to refer to those activities, which are necessary to manufacture products. However, in many companies the area is broad enough to include such activities as purchasing, warehousing, transportation, and other operations from the procurement of raw materials through various activities until a product is available to the buyer.

The production system generally includes all activities relating to production planning, product engineering, scheduling and operations of production facilities, quality control etc. the decision making is based on information in form of pending sales orders, expected sales, consumer grievances, etc. production decisions are

aimed towards monitoring of in-process inventory, balancing of daily finished and semi-finished stocks, correction of any deviation in production performance.

- 4. Personnel System-** The personnel information system deals with the flow of information about people working in the organization as well as future personnel needs. In most of the organizations, the system is concerned primarily with the six basic sub systems of the personnel function; recruitment, training, compensation, maintenance and health and safety.

It is generally accepted that the personnel function is one of the best computerized of all the personnel functions. Authorized system may not be necessary for small firms, but large business firms are realizing that computer based personnel information systems are necessary for increasing the operational efficiency of personnel management.

Q-8 What is Productional Information System?

Q-9 Point out the basic requirements for production planning & control ?

Ans- The main requirements of production planning control system are as follows:

1. Firm's policy with regard to production of various products.
2. Sales order, sales forecast, stock positions, order backlog.
3. Available labour force with their capabilities
4. Standards of labour time, material, machine time and overhead costs, etc.
5. Schedule of meeting the sales orders, region wise, territory wise etc.
6. Quality norms for materials to be used and for the finished products.
7. Break-up of the jobs and their resources requirements.

Q -10 "Personnel Information System deals with the flow of information relating to people" Explain ?

Ans- The personnel information system should be organized on functional basis. It should have the following information sub system to increase the operational efficiency of personnel management.

1. **Recruitment-** properly managed recruitment sub system may forecast personnel needs and skills required for recruiting personnel at the proper time to meet organizational manpower needs. Such a sub system may not only furnish information concerning skills required for company programs and processes but also maintains the inventory of skills available within the organization.
2. **Placements-** This sub system is concerned with the task of matching the available persons with the requirements. A good placements sub system makes use of latest behavioural tools and techniques. It ensures that the capabilities of people are identified before being matched with properly organized work requirements.
3. **Training and development-** As technological changes and demands for new skills accelerate, many new companies find that they must develop much of their requirements from internal sources. In addition, a large part of the work force

must constantly be updated in new techniques and developments. This task is the function of the training and development sub system.

4. **Compensation-** This sub system is concerned with the task of determining pay and other benefits for the workers of the concern. It makes use of traditional payroll and other financial records, government reports and unions expectation before arriving at the final figure of pay and other benefits for each category of workers.
5. **Maintenance-** This sub system is designed to ensure that personnel policies and procedures are achieved. It may be extended to the operation of systems control, work standards which are required to measure performance against financial plans or other programmes, and the many subsidiary records normally associated with the collection, maintenance and dissemination of personal data.
6. **Health & Safety-** This sub system is concerned with the health of personnel and the safety of jobs in the organization.

**Q-11 Differentiate Between – a) Programmed and Non Programmed Decisions
b) Strategic and tactical Decisions
c) Individual and Group Decision**

Ans- (a) Programmed decisions : Programmed decisions refer to decisions made on problems and situations by reference to a predetermined set of precedents, procedures, techniques and rules. These are well-structured in advance and are time tested for their validity. As a problem or issue for decision making emerges, the relevant pre-decided rule or procedure is applied to arrive at the decision. For example, in many organizations, there is a set procedure for receipt of material, payment of bills, employment of clerical personnel, release of budgeted funds, and so on.

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(b) Strategic Level- strategic level management is concerned with developing of organizational mission, objectives and strategies. Decision made at this level of organization to handle problems critical to the survival and success of the organization, are called strategic decisions. They have a vital impact on the direction and functioning of the organization-as for example decision on plant location, introduction of new products, making major new fund raising and investment operations, adoption of new technology, acquisition of outside enterprise and so on.

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(c) Individual Decisions- Many decisions, even critical ones, in organizations are made by individual managers, who assume full responsibility for the consequences of such decisions. Infact, individual managers are vested with enough authority to make a large number of decisions; they are paid for the job. The individual managers at their respective levels-right from the chief executive down to first line supervisor-are called upon to decide many things. They may get information, factual analytical reports, pros and cons of alternatives and suggested courses of action from their subordinates or from specially established committees. But the responsibility and authority or the onus of making the final decision rests with the concerned manager himself. He can not delegate or abdicate this authority.

Group Decisions- Group Decisions are those, which are made by, more than one manager joining together for the purpose. In an organization, two or more managers at the same or different levels put their heads together, jointly deliberate on the problem, information and alternatives and hammer out a decision for which they assume collectively responsibility. Decisions, which have inter departmental effects- for example a product related decision affecting manufacturing, purchasing and marketing- departments, are some times made by forming a committee, composed of responsible executives of the three departments.

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CHAPTER 5

Q-12 Discuss various components of DSS. Also explain the categories of software tools available?

Ans- A decision support system has four basic components: (1) The user (2) One or more database (3) A planning language (4) The model base

(1) The Users- The user of a decision support system is usually a manager with an unstructured or semi-structured problem to solve. The manager may be at any level of authority in the organization (e. g. either top management or operating management). Typically, users do not need a computer background to use a decision support system for problem solving. The most important knowledge is a thorough understanding of the problem and the factors to be considered in finding a solution

(2) Database- Decision support system include one or more databases. These databases contain both routine and non routine data from both internal and external sources. The data from external sources include data about the operating environment surrounding an organization- for example, data about economic conditions, market demand for the organization's goods or services, and industry competition

decision support users may construct additional databases themselves. Some of the data may come from internal sources

(3) Planning languages- Two types of planning languages that are commonly used in decision support systems are (1) General purpose planning languages and (2) special purpose planning languages. General purpose planning languages allow users to perform many routine tasks- for example, retrieving various data from a data base or performing statistical analyses. The languages in most electronic spreadsheets are good examples of general purpose planning languages.

Special purpose planning languages are more limited in what they can do, but they usually do certain jobs better than the general purpose planning languages. Some statistical languages, such as SAS, SPSS, and Minitab, are example of special purpose planning languages.

(4) Model Base- The planning language in a decision support system allows the users to maintain a dialogue with the model base. The model base is the brain of the decision support system because it performs data manipulations and computations with the data provided to it by the user and the database there are many types of model bases, but most of them are custom developed models that do some types of mathematical functions-for example, cross tabulation, regression analyses, time series analyses, linear programming and financial computations. The model base may dictate the type of data included in the database and the type of data provided by the user.

Categories of Software Tools-

The tools of decision support include a variety of software supporting database query, modeling, data analyses, and display. A comprehensive tool kit for DSS would include software supporting these application areas.

Example of software tools falling into these four categories are given below.

Data Based Software	Model Based Software	Statistical Software	Display Based Software
DBASE IV	Foresight	SAS	Chartmaster
FOCUS	IFPS	SPSS	SASGRAPH
NOMAD II	Lotus 123	TSAM	TELLAGRAF
RAMIS	Model		
R : Base 5000	Multiplan		
SQL	Omnicalc		

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CHAPTER 6

Q-13 What are the benefits of Client Server Technology?

Ans- Client/server systems have been hailed as bringing tremendous benefits to the new user, especially the users of mainframe systems. Consequently, many businesses are currently in the process of changing or in the near future will change from mainframe (or PC) to client/server systems. Client/server has become the IT solution of choice among the country's largest corporations. In fact, the whole transition process, that a change to a client/server invokes, can benefit a company's long run strategy.

- People in the field of information system can use client/server computing to make their jobs easier.
- Reduced the total cost of ownership.
- Increased productivity
- End user productivity
- Developer productivity
- Takes less people to maintain a client/server application than a mainframe
- The expense of hardware and network in the client/server environment are less than those in the mainframe environment
- Users are more productive today because they have easy access to data and because applications can be divided among many different users so efficiency is at it's highest
- Client/server applications make organizations more effective by allowing them to port applications simply and efficiently
- Reduce the cost of the client's computer: the server stores data for the clients rather than clients needing large amounts of disk space. There fore, the less expensive network computers can be used instead
- Reduce the cost of purchasing, installing, and upgrading software programs and applications and applications on each client's machine: delivery and maintenance would be from one central point, the server.
- The management control over the organization would be increased
- Many times easier to implement client/server than change a legacy application
- Leads to new technology and the move to rapid application development such as object oriented technology.
- Long term cost benefits for development and support.
- Easy to add new hardware to support new systems such as document imaging and video teleconferencing which would not be feasible or cost efficient in a mainframe environment.
- Can implement multiple vendor software tools for each application.

Q-14 Write short note on Server Centric Model?

Ans- The TCO (Total Cost of Ownership) is one of the greatest concerns in today's enterprises computing environment. In the past, much attention has been focused on the initial acquisition costs to create an enterprises computing system rather than the ongoing costs of ownership. According to many research, companies' acquisition costs- although a substantial one time investment- represent only a portion of the total cost of an enterprise computing solution. Today, however, the focus has shifted to recurring costs, often called

“soft” costs because they are difficult to quantify. Server-centric computing is a model, in which applications are deployed, managed, supported and executed 100% on a server. The client handles data entry and information display.

It uses a multi user operating system and a method for distributing the representation of an application's interface to a client device.

Traditionally used for centralizing business applications such as general ledger, payroll, order entry and point of sale applications, this recently expanded model now includes web based applications where users browse through data over the network. Almost any client device can be adapted for use with server centric applications

Q-15 What are the risks associated with the client-server architecture? Discuss some control techniques that are essential for client server security?

Ans- The benefits from the client/server are truly praiseworthy but there are also risks involved in the transition from mainframe (or PC) to client/server. We can classify these risks into four categories : operational, technological, economic, and political

Technological Risks : the technological risk is quite simple- will the new system work? The short term aspect of this question is – will it literally work? But more important is the risk that in the long run the system may grow obsolete. To resolve this issue the firm and its consultant/division making process while deciding what systems to incorporate into their organizations.

Operational Risks : These risks parallel the technological risks in both the short and long run. Respectively, they are : will you achieve the performance you need from the new technology and will the software that you chose be able to grow or adapt to the changing needs of the business. Once again sound planning and keeping an eye to the future are the only remedies for these risks.

Economic Risks : In the short run, firms are susceptible to hidden costs associated with the initial implementation of the new client/server system. Cost will rise in the short term since one needs to maintain the old system(mainframe) and the new client server architecture development. In the long run, the concern centers around the support costs of the new system.

Political Risks : finally, political (people) risks involved in this transition are addressed. Here, the short term question is-will end users and management be satisfied? The answer to this definitely not if the system is difficult to use or is plagued with problems.

Client/Server Security –

Security procedures for client/server technology is not clearly defined or protected. As they utilize distributed techniques there is an increased risk of access of data and modification. To get secured client/server environment all access points should be known. As the application data may exist on the server or client, a number of access routes exist, which should be examined and checked.

To increase the security, an IS auditor should ensure that the following control techniques are in place :

- Access to data and application is secured by disabling the floppy disk drive.
- Diskless workstation prevents unauthorized access
- Unauthorized users may be prevented from overriding login scripts and access by securing automatic boot or startup batch files.
- Network monitoring can be done to know about the client so that it will be helpful for later investigation, if it is monitored properly. Various network monitoring devices are used for this purpose. Since this a detective control technique, the network administrator must continuously monitor the activities and maintain the devices, otherwise these tools become useless.
- Data encryption techniques are used to protect data from unauthorized access.
- Authentication systems can be provided to a client, so that they can enter into system, only by entering login name and password.
- Smart cards can be used. It uses intelligent hand held devices and encryption techniques to decipher random codes provided by client server based operating systems. A smart card displays a temporary password based on an algorithm and must be re-entered by the user during the login session for access onto the client-server system.
- Application controls may be used and users will be limited to access only those functions in the system that are required to perform their duties.

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CHAPTER 7

Q-16 Write Short Notes on –

- 1) System development life cycle
- 2) Feasibility study
- 3) System analyses
- 4) System Development Methodology
- 5) Software project manager
- 6) Data dictionary

Ans- 1) System development life cycle - The system development life cycle method can be thought of as a set of activities that analysts, designers and users carry out to develop and implement an information system. In most business situations, these activities are all closely related, usually inseparable and even the order of the steps in these activities may be difficult to determine. Different parts of a project can be in various phases at the same time, with some components undergoing analysis while others are at advanced design stages.

The system development life cycle method consists of the following activities :

- (i) Preliminary investigation
- (ii) Requirement analyses or system analyses
- (iii) Design of system
- (iv) Development of software
- (v) System testing
- (vi) Implementation and maintenance

2) Feasibility study – after possible solution options are identified, project feasibility- the likelihood that these systems will be useful for the organization-is determined. A feasibility study is carried out by the system for this purpose. Feasibility study refers to a process of evaluating alternative systems through cost/benefit analyses so that the most feasible study of a system is undertaken from three angles : technical, economic and operational feasibility. The proposed system is evaluated from a technical view point first and if technically feasible, its impact on the organization and staff is assessed. If a compatible technical and social system can be devised, it is then tested for economic feasibility.

3) System Analysis-

4) System Development Methodology- Methodology means methods followed, here system development methodology means methods followed for system development.

A system development methodology (also known as system development life cycle (SDLC) methodology) is formalized, standardized well documented set of activities used to manage a system development project. This should be used when information system is developed or maintained.

The methodology has the following characteristics-

1. Divide the project into manageable task and manageable process. This process help in project planning and control

2. Document every step and process and produce specific records and other documents during system development to make development team accountable for system execution and these documents and reports become a reference for training and maintenance of system.
3. Assure the participation of users, managers and auditors in the project. These generally provide approvals often called signoff at pre established points and this signify the approval of development profess and system being development.
4. The system must be tested thoroughly prior to implantation to ensure that it meets user's requirement.
5. A training plan should be developed for those who will operate and use the new system.
6. A post implementation review of developed system must be performed to access the efficiency and effectiveness of system.
7. an organization system development methodology should be documented in the form of system development standards manual.

5) Software project management-

6) Data dictionary- data dictionary is a computer file which stores description of all data elements, their attributes & relationships. It has many uses like acting as guide to analyst/programmer/auditors/accountants, helps in audit trail & in planning data flow to the I/S & also serves as an aid investigating & developing internal control procedures. It generally contains-

- a. Names of the computer data files
- b. Name of the computer program that modify data
- c. Field names, their width & data type, range
- d. Identity of source document used to create data
- e. Identity of users permitted to access database & their rights like add, edit, view, delete, report etc.
- f. Identity of users not permitted & their rights like add, edit, view, delete, report etc
- g. Identity of programs permitted to access database
- h. Identity of programs not permitted to access database
- i. Details about edit controls
- j. Details about data security

Q-17 What is DFD? Give one example..

CHAPTER 8**Q-18 What guide lines should be followed while designing printed and screen output?**

Ans. There are certain guidelines, which should be followed while preparing the layout form. It will not make the analyst's job easier, but will also ensure that users will receive an understandable report. Some of these guidelines are summarized below.:

1. Reports and documents should be designed to read from left to right and top to bottom.
2. The most important items should be easiest to find.
3. Each printed report should include the heading or title of the report, page number, date of preparation and column headings. The heading or title of the report orients the users to what it is they are reading. The title should be descriptive, yet concise. Each page should be numbered so that the users has an easy point of reference when discussing output with others or relocating important figures. The date of report preparation should be included on each print out. Some times this helps users to estimate the value of the output. Column headings serve to further orient the user as to the report contents.
4. Each data item must have a heading. Which should be short and descriptive. Data items are related to one other should be grouped together on the report.
5. Control breaks should be used in the report to help readability. They should be separated from the rest of data with additional lines. Attention should be drawn to control breaks summaries and other important information by boxing them off with special characters such as asterisks or extra space. This makes it easier to find critical information.
6. Sufficient margin should be left on the right and left as well as top and bottom of an output report. This enables the user to focus his attention on the material centered on the page and makes reading easier.
7. The details line for variable data should be defined by indicating whether each space is to be used for an alphabetic, special or numeric character.
8. The mock up reports should be reviewed with users and programs for feasibility, usefulness, readability, understandability and an esthetic appeal

Q-19 Why coding system is required in information system. List the characteristics of good coding scheme and also some commonly used coding scheme.

Ans- Coding Methods :- Information system projects are designed with space, time and cost saving in mind. Hence, coding methods in which conditions, words or relationships are expressed by a code are developed to reduce input, control errors and to speed up the entire process. A code is a brief number, title or symbol used instead of lengthy or ambiguous description. When an event occurs, the details of the event are summarized by the code. The system analyst is responsible for devising an appropriate coding scheme. Although there exist coding schemes in manual system also, it is usually necessary to modify these to suit

computer capabilities, since human beings can manage with bad and disorganized coding schemes but not the computer.

Some of the desired characteristics of a good coding schemes are enumerated below.

(i) Individuality : The codes must identify each object in a set uniquely and with absolute precision. To use one code number for several objects in a set would obviously cause a great deal of confusion. Furthermore, the code should be universally used over the entire organization.

(ii) Space : As far as possible a code number must be much briefer than description

(iii) Convenience : The formats of code numbers should facilitate their use by people. This implies that the code number should be short and simple and consist of digits and or upper case alphabets. It is better to avoid the use of such special symbols as hyphens, oblique, dot, etc.

(iv) Expandability : As far as possible future growth in the number of objects in a set should be provided for. Therefore, whilst introducing the scheme, longer number of digits/number than necessary at present may be adopted as the code length.

(v) Suggestiveness : The logic of the coding scheme should be readily understandable. Also, the letter or number should be suggestive of the item characteristics e. g., whether it made from a casting or rolled stock, whether it pertains specifically to such and such model or it is used commonly by more than one end product.

(vi) Permanence : Changing circumstances should not invalidate the scheme or invalidation in the future should be kept to minimal.

Coding schemes :- some common examples of Coding Schemes are –

Classification Codes Place separate entities (e.g. place, events, people, objects, features etc.) into distinct group classes which are used to distinguish one class from another, small or single digits e.g. first digit of material items in an automobile company signifying vehicle model ranging from 0-9.

Function Codes State activities/ work to be performed without giving all details e.g. in a TPS separate codes can be given to function of updating, adding, deleting records in a database.

Significant Digit Subset Codes To code complex item which carry various information, Codes can be divided into subsets or sub codes where various digits & their group signify different details e. g. for coding inventory items an 8 digit coding scheme can be developed where first three digits are for product class, Next three for item number & last two for vendor code.

Mnemonic Codes Suitable where codes are to be remembered by users. Use abbreviations generally having alphabets e.g. CA, MBA etc.

Hierarchical Suitable for complex item where various details & classifications are

Classification involved . Tree structure can be made having various alternatives.

Codes Coding can be done using digits to signify various levels.

Q-20 Write short note on –

(i) Application package

(ii) Program debugging

(iii) Bench marking problem

(iv) Program development life cycle

(v) system testing

Ans- (i) Application package

(ii) Program debugging- the process of debugging a program refers to correcting programming language syntax and diagnostic errors so that the programs “ compile cleanly”. A clean compile means that the program can be successfully converted from the source code written by the programmer into machine language instructions. Once the programmer achieves a clean compile, the program is ready for structure walk through discussed below.

Debugging can be tedious task. It consists of four steps : inputting the source program to the compiler, letting the compiler find error in the program, correcting lines of code that are in error, and resubmitting the corrected source program as input to the compiler. The length of time required to debug a program can be shortened considerably by the use of an interactive compiler which checks the source program and displays any errors on a CRT or prints them on a printer. The programmer corrects the indicated errors and initiates the interactive compiler as often as necessary until all errors are corrected.

(iii) Bench marking problem – Benchmarking problems for vendor’s proposals are sample programs that represent at least a part of the buyer’s primary computer work load. They include software considerations and can be current applications programs or new programs that have been designed to represent planned processing needs i.e., benchmarking problem are oriented towards testing whether a computer offered by the vendor meets the requirements of the job on hand of the buyer. They are required to be representative of the job on hand of the buyer. Obviously benchmarking problems can be applied only if job mix has been clearly specified. If the job is truly represented by the selected benchmarking problems, then this approach can provide a realistic and tangible basis for comparing all vendor’s proposals.

(iv) Program development life cycle

(v) System Testing- System level testing must be conducted prior to installation of an information system. It involves (a) preparation of realistic test data in accordance with the system test plan, (b) processing the test data using the new equipment, (c) through checking of the results of all system tests, and (d) reviewing the results with future users, operators and support personnel. System level testing is an excellent time for training employees in the operation of the IS as well as maintaining it. Typically, it requires 25 to 35 percent of the total implementation effort.

One of the most effective way to perform system level testing to perform parallel operations with the existing system. During parallel operations, the mistakes detected are often not those of the new system, but of the old. These differences should be reconciled as far as it is feasible economically.

CHAPTER 10

Q- 21 Describe the four aspects of system implementation phase?

Ans-The process of ensuring that the information system is operational and then allowing users to take over its operation for use and evaluation is called systems implementation. Implementation includes all those activities that take place to convert from the old system to the new.

Successful implementation may not guarantee improvement in the organization using the new system but improper installation will prevent it. There are four aspects of implementation are –

- Equipment Installation
- Training Personnel
- Conversion Procedure
- Post implementation Evaluation

1. EQUIPMENT INSTALLATION

The hardware required to support the new system is selected prior to the implementation phase. The necessary hardware should be ordered in time to allow for installation testing of equipment during the implementation phase. An installation checklist should be developed at this time with operating advice from the vendor and system development team. In those installations where people are experienced in the installation of the same or similar equipment, adequate time should be scheduled to allow completion of the following activities:

- i. **Site Preparation:** An appropriate location must be found to provide an operating environment for the equipment that will meet the vendor's temperature, humidity and dust control specification. The site layout should allow ample space for moving the equipment in and setting it for normal operation.
- ii. **Equipment Installation :** The equipment must be physically installed by the manufacturer, connected to the power source and wired to communication lines if required.
- iii. **Equipment Check Out :** The equipment must be turned on for testing under normal operating conditions. Not only the routine 'diagnostic test' should be run by the vendor, but also the implementation team should devise and run extensive tests of its own to ensure that equipment are in proper working conditions.

2. TRAINING PERSONNEL

A system can succeed or fail depending on the way it is operated and used. Therefore, the quality of training received by the personnel involved with the system in various capacities helps or hinders the successful implementation system. Thus, training is becoming a major component of system implementation. When a new system is acquired which often involves new hardware and software, both users and computer professionals generally need some type of training.

- i. **Training System Operators :** Many systems depend on the computer centre personnel, who are responsible for keeping the equipment running as well as for providing the necessary support services. Their training must ensure that they are able to handle all possible operations, both routine and extra-ordinary. Operators training must also involve the data entry personnel.

The operators should also be instructed in what common malfunctioning may occur how to recognize them, and what steps to take when they arise. Training also involves familiarization with run procedures, which involves working through the sequence of activities needed to use a new system on an on going basis.

- ii. **User Training :** User training may involve equipment use, particularly in the case where a micro computer is in use and the individual involved is both operator and user. Users must be instructed first how to operate the equipment. Users should be trained on data handling activities such as editing data, formulating inquiries (finding specific records or getting responses to questions) and deleting records of data. If a micro computer or data entry system disks, users should be instructed in formatting and testing disks.

3. CONVERSION OR CHANGE OVER FROM MANUAL TO COMPUTERISED SYSTEM –

Conversion or changeover is the process of changing from the old system to the new system. It requires careful planning to establish the basic approach to be used in the actual changeover. There are many conversion strategies available to the analyst who has to take into account several organisational variables in deciding which conversion strategy to use. There is no single best way to proceed with conversion. It may be noted that adequate planning and scheduling of conversion as well as adequate security are more important for a successful changeover.

Conversion strategies : There are five strategies to convert the old system to the new system.

- (a) **Direct Changeover:** When on a specified date old system is dropped & new is followed- successful if extensively tested beforehand- risky approach- users may resent due to unfamiliarity- no way to compare the two system.
- (b) **Parallel Conversion:** Most frequently used – feeling of security to users – comparison possible – disadvantages are doubling of work load & costs
- (c) **Gradual Conversion :** Combines best of the earlier two plans – volume of transactions is gradually increased – easy to detect & recover from errors – disadvantages are time consuming & unsuitable for small organizations
- (d) **Modular Prototyping :** Uses building of modular operational prototypes in gradual manner – module by module acceptance & use – thorough testing of each - problem in integration & interface.

- (e) **Distributed Conversion** : Refers to a situation when many installation of same system are required like branches or franchise – conversion is done site by site – uses experience but problem of uniqueness in each site

Activities involved in conversion are –

- a. **Procedure conversion** Operating procedures for computer & other functional area must be documented & spelled out to staff & tested after implementation
- b. **File conversion** From manual to computerized database files – online or offline
- c. **System conversion** Integration of new all new inputs, processes, hardware, software etc
- d. **Scheduling personnel & equipment**
- e. **Alternative plans in case of failure**

4. EVALUATION OF THE NEW SYSTEM

The final step of the system implementation is evaluation. Evaluation provides the feedback necessary to assess the value of information and the performance of personnel and technology included in the newly designed system. This feedback serves two functions.

1. It provides information as to what adjustments to the information system may be necessary.
2. It provides information as to what adjustment should be made in approaching future information systems development projects.

There are two basic dimensions of information systems that should be evaluated. The first dimension is concerned with whether the newly developed system is operating properly. The other dimension is concerned with whether the user is satisfied with the information system with regard to the reports supplied by it.

- i. Development evaluation
- ii. Operational evaluation
- iii. Informational evaluation

Q-22 Write Short Note on –

- i. Post implementation evaluation
- ii System maintenance

Ans : . (i) Post implementation evaluation-

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- iv. Development evaluation
- v. Operational evaluation
- vi. Informational evaluation

(ii) System maintenance-

Most information systems requires at least some modifications after development. The need for modification arises from a failure to anticipate all requirements during system design and/or from changing organizational requirements. Consequently periodic systems maintenance is required for most of the information systems. Systems maintenance involves adding new data elements, modifying reports, adding new reports, changing calculations, etc.

Maintenance can be categorized in the following two ways :

1. scheduled maintenance is anticipated and can be planned for, for example the implementation of a new inventory coding scheme can be planned in advance.
2. Rescue maintenance refers to previously undetected malfunctions that were not anticipated but require immediate solution. a system that is properly developed and tested should have few occasions of rescue maintenance.

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Chapter 11

Q-23 Draw system flow chart & explain input files and outputs of accounts payable system?

Ans- view page No 11.7 of ICAI study module

Q- 24 Draw system interface chart & explain inputs & files of WIP control system?

Ans- view page number 11.41 of ICAI study module

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Chapter 12

Q- 25 What is BPR? How is it concerned with the implementation of ERP?

Ans- The most accepted and formal definition for BPR, given by Hammer and Champy is reproduced here, “ BPR is the fundamental rethinking and radical redesigning of processes to achieve dramatic improvement, in critical, contemporary measures of performance such as cost, equity, service and speed.” This has a few important key words, which need clear understanding. Here, dramatic achievement means to achieve 80% or 90% reduction (in say, delivery time, work in progress or rejection rate) and not just 5%, 10% reduction.

Radical redesign means BPR is reinventing and not enhancing or improving. In a nutshell, a “cleanslate approach” of BPR says that “ Whatever you were doing in the past is all wrong”, do not get biased by it or reassemble your new system to redesign it afresh. Fundamental rethinking means asking the question “ why do you do what do you do”. Thereby eliminating business process altogether if it does not add any value to the customer.

Thus BPR aims at major transformation of the business processes to achieve dramatic improvement. Here, the business objectives of the enterprises (e.g. profits, customer-satisfaction through optimal cost, quality, deliveries etc.) are achieved by “transformation” of the business process which may, or may not, require the use of information technology (IT)

BPR’s concern with the implementation of ERP-

ERP merges very well with common business management issues like Business Process reengineering, total quality management, mass customization, service orientation, and virtual corporation etc. the basic objective of implementing an ERP program is to put in place the applications and infrastructure architecture that effectively and completely support the enterprise’s business plan and business process. When an enterprise does not have optimized business processes, the ERP implementation needs a process reengineering which enable to capture knowledge of the experts into the system thus gaining considerable benefits in productivity.

Q-26 Write short notes on-

- (i) Business Modelling**
- (ii) SAP R/3 Package**

Ans- (i) Business Modelling- The approach of ERP implementation is carried out using MIS planning. First of all, a model consisting of core business process or activities is to be developed. This is the diagrammatic representation of business as a large system with interconnection of subsystems or processes that it comprises of. We can model business as a system making the processes managing their facilities and material as their resources. Information is treated as a vital resource managing other resources.

Business model is accompanied with a data model which consists of description of the following entities –

1. External Data – customers, suppliers, Competitors, distributors
2. Internal Data – Funds, Mkt. Research, Production, Inventory, Personnel, sales, payroll, General Ledger

(ii) **SAP R/3 Package-** In five years R/3 is the market leader in new sales. Its philosophy of matching business processes to modules is excellent. It offers a wide range of functions and its major shortcomings are yet to be identified. However, it remains complex, because it offers much; few people know how to get the best from it. R/3 will be around for a long time; few people get fired for buying it.

Q-27 Discuss the characteristics and benefits of ERP?

Ans- ERP Characteristics : An ERP system is not only the integration of various organization processes. Any system has to possess few key characteristics to qualify for a true ERP solution. These features are :

Flexibility : An ERP system should be flexible to respond to the changing needs of an enterprise. The client server technology enables ERP to run across various database back ends through Open Data Base Connectivity (ODBC)

Modular & Open : ERP system has to have open system architecture. This means that any module can be interfaced or detached whenever required without affecting the other modules. It should support multiple hardware platforms for the companies having heterogeneous collection of systems. It must support some third party add-ons also.

Comprehensive : It should be able to support variety of organizational functions and must be suitable for a wide range of business organizations.

Beyond the company : It should not be confined to the organizational boundaries, rather support the online connectivity to the other business entities of the organization.

Best business practices : It must have a collection of the best business processes applicable worldwide. An ERP package imposes its own logic on a company's strategy, culture and organization.

Benefits of ERP :- The benefits accruing to any business enterprises by implementing an ERP package are unlimited. According to companies like NIKE, DHL, Tektronix, Fujitsu, Millipore and Sun Microsystems, the following are some of the benefits they achieved by implementing the ERP packages.

- Give Accounts Payable personnel increased control of invoicing and payment processing and thereby boosting their productivity and eliminating their reliance on computer personnel for these operations.
- Reduce paper documents by providing on line formats for quickly entering and retrieving information.
- Improves timeliness of information by permitting posting daily instead of monthly
- Greater accuracy of information with detailed content, better presentation, satisfactory for the auditors.
- Improved cost control
- Faster response and follow up on customers
- More efficient cash collection, say, material reduction in delay in payments by customers.

- Better monitoring and quicker resolution of queries.
- Enables quick response to change in business operations and market conditions.
- Helps to achieve competitive advantage by improving its business process.
- Improves supply demand linkage with remote locations and branches in different countries.
- Provides a unified customer database usable by all applications.
- Improves information access and management throughout the enterprise.
- Provides solution for problems like Y2K and Single Monetary Unit (SMU) or Euro Currency.

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Chapter-13**Q- 28 What are the functions of Operating Systems? Discuss the associated Operating System Control?**

Ans : The operating system is the computer's control program. It allows users and their applications to share and assess common computer resources, such as processors, main memory, databases, and printers. The modern accountant needs to recognize the operating system's role in the overall control picture to properly assess the risks that threaten the accounting system.

If operating system integrity is compromised, controls within individual accounting applications may also be circumvented or neutralized. Because the operating system is common to all users, the larger the computer facility, the greater the scale of potential damage. Thus, with more and more computer resources being shared by an ever-expanding user community, operating system security becomes an important control issue.

The main functions of Operating Systems are :

1. Allocation or management of hardware resources such as CPU, Memory, Printer etc. to users/application
2. Providing interface between user and computer system
3. Job scheduling & special tasks like multiprogramming etc.
4. Assigning memory workspace/partitions to applications
5. Authorizing access to terminals, databases, printers etc.

Associated Operating System Control :

To perform the abovementioned tasks consistently and reliably, the operating system must achieve five fundamental control objectives.

1. The operating system must protect itself from users. User applications must not be able to gain control of, or damage in any way, the operating system, thus causing it to cease running or destroy data.
2. The operating system must protect users from each other. One user must not be able to access, destroy, or corrupt the data or programs of another user.
3. The operating system must protect users from themselves. A user's application may consist of several modules stored in separate memory locations, each with its own data. One module must not be allowed to destroy or corrupt another module.
4. The operating system must be protected from itself. The operating system is also made up of individual modules. No modules should be allowed to destroy or corrupt another module.
5. The operating system must be protected from its environment. In the event of a power failure or other disaster, the operating system should be able to achieve a controlled termination of activities from which it can later recover.

Q- 29 Write Short Note on (i) Source Program Library
(ii) Disaster Recovery Plan
(iii) System development Control

Ans :

(i) Source Program Library : In larger computer systems, application program modules are stored in source code form on magnetic disks called the source program library (SPL)

The Worst Case Situation – No Control : This arrangement has the potential to create two serious forms of exposure :

1. Access to programs is completely unrestricted. Programmers and others can access any program stored in library, and there is no provision for detecting an unauthorized intrusion.
2. Because of these control weaknesses, programs are subject to unauthorized changes. Hence, there is no basis for relying on the effectiveness of other controls (maintenance authorization, program testing, and documentation). In other words, with no provision for detecting unauthorized access to the SPL, the program's integrity can not be verified.

A Controlled SPL Environment : To control the SPL, protective features and procedures must be explicitly addressed. This requires the implementation of an SPL management system (SPLMS).

(ii) Disaster Recovery Plan : some disasters can not be prevented or evaded. The survival of a firm affected by such a disaster depends on how it reacts. With careful planning, the full impact of a disaster can be absorbed and the organization can still recover.

The term "Disaster Recovery" describe the contingency measures that organizations have adopted at key computing sites to recover from, or to prevent any monumentally bad event or disaster. A disaster may result from natural causes such as fire, flood or earthquake etc. or from other sources such as a violent takeover, willful or accidental destruction of equipment or any other act of such catastrophic proportions that the organizations could be ruined. The primary objective of a disaster recovery plan is to assure the management that normalcy would be restored in a set time after any disaster occurs, thereby minimizing losses to the organization

Although each organization would like to have a specifically tailored disaster recovery plan, the general components of the plan would be as follows :

1. **Emergency Plan :** It identifies the personnel to be notified immediately, for example, fire service, police, management, insurance company etc. it provides guidelines on shutting down equipment, termination of power supply, removal of storage files and removable disks, if any.
2. **Recovery Plan :** A recovery committee is constituted. Preparing specifications of recovery like setting out priorities for recovery of application systems, hardware replacements etc. will be the responsibility of recovery plan.
3. **Backup Plan :** An effective safeguard is to have a backup of anything that could be destroyed, be it hardware or software. It is necessary to make copies of

important programs, data files, operating systems and test programs etc. in order to get back into operation before the company can suffer an intolerable loss.

4. **Test Plan :** It identifies deficiencies in the emergency, backup or recovery plan. It contains procedures for conducting DRP testing like.

- (i) Paper walk-throughs
- (ii) Localised tests
- (iii) Full operational tests

(iii) System development Control :-

The six activities discussed below deal with the authorization, development and implementation of the original system.

System Authorization Activities : All systems must be properly authorized to ensure their economic justification and feasibility. Each new system request be submitted in written form by users to system professionals who have both the expertise and authority to evaluate and approve (or reject) the request.

User Specification Activities : Users must be actively involved in the systems development process. The creation of a user specification document often involves the joint efforts of the user and systems professionals. However, it is most important that this document remain a statement of user needs. It should describe the users's view of the problem, not that of the systems professionals.

Technical Design Activities : The technical design activities in the SDLC translate the user specifications into a set of detailed technical specifications of a system that meets the user's needs. The adequacy of these activities is measured by the quality of the documentation that emerges from each phase. Documentation is both a control and evidence of control and is critical to the system's long term success.

Internal Audit Participation : The auditor should become involved at the inception of the SDLC process to make conceptual suggestion regarding system requirements and controls. Auditors involvement should continue throughout all phases of the development process and into the maintenance phase.

Program Testing : All programs modules must be thoroughly tested before they are implemented. The results of the tests are then compared against predetermined results to identify programming and logic errors.

User Test And Acceptance Procedure : Just before implementation, the individual modules of the system must be tested as unified whole. A test team comprising user personnel, system professionals, and internal audit personnel subjects the system to rigorous testing. Once the test team is satisfied that the system meets its stated requirements, the system is formally accepted by the user department(s)

Chapter 14**Q-30 Discuss 3 Levels of Validation Controls?**

Ans : Input validation controls are intended to detect errors in transaction data before the data is processed. Validation procedure are most effective when they are performed as close to the source of the transaction as possible. Compute Based Information System (CBIS) using real time processing or batch processing with direct access master files can validate data at the input stage.

There are three levels of Input validation controls :

- (a) Field Interrogation
- (b) Record Interrogation
- (c) File interrogation

(a) **Field Interrogation:** Field interrogation involves programmed procedures that examine the characters of the data in the field. The following are some common types of field interrogation

- (1) **Limit Checks** may be applied to both the input data and output data. The field is checked by the program to ensure that its value lies within certain precedents limits (in the programs). This applies to both input and output fields considered to be important.
- (2) **Picture Checks** these checks against entry into processing of incorrect character.
- (3) **Valid Code Checks** : Checks are made against predetermined transaction codes, table or order data to ensure that input data are valid. The predetermined codes or tables may either be embedded in the programs or stored in (direct access) files.
- (4) **Check digit** : One method for detecting data coding errors is a check digit. A check digit is a controlled digit (or digits) added to the code when it is originally assigned that allows the integrity of the code to be established during subsequent processing. The check digit can be located anywhere in the code, as a prefix, a suffix or embedded someplace in the middle. Whenever the code is transcribed from one document to another this checks is to be effected
- (5) **Arithmetic Codes** :Arithmetic is performed in different ways to validate the result of other computations of the values of selected data fields
- (6) **Cross Checks** : may be employed to verify fields appearing in different files to see that the result tally.

(b) **Record Interrogation :**

(i) **Sequence checks** are exercised to detect any missing transaction, off serially numbered vouchers (subsequently transcribed for computer processing) or erroneous sorting.

(ii) **Format completeness checks** are used to check the presence and positions of all the data fields in a transaction. This check is particularly useful for variable dat field records.

(iii) **Redundant data checks** are used in sequential processing. Matching keys of the transaction record and its master record may not be deemed enough. One may, in a sales application for example, want to compare, say first five characters of the customer's name.

(iv) **Combination Checks** : Credit against shipments is invalid and ought to be rejected

(v) **Passwords** are issued to the various users in online systems for processing their enquiries. It is desirable to periodically change the passwords.

(vi) Once a user has been identified in an online system, it remains to be seen what he is authorized to access, read, write etc.

(c) **File Interrogation** : The purpose of file interrogation is to ensure that the correct file is being processed by the system. These controls are particularly important for master files, which contain permanent records of the firm and which, if destroyed or corrupted, are difficult to replace.

Q- 31 Write short note on-

(i) **Batch Control**

(ii) **Check Digits**

(iii) **Run to Run control**

(iv) **Audit Trail control**

(v) **Tape and Disk O/p Control**

Ans : (i) Batch Control :- Batch control are an effective method of computing of meaning high volumes of transaction data through a system. The objective of batch control is to reconcile output produced by the system with the input originally entered into the system.

This provides that :

- All records in the batch are processed
- No records are processed more than once
- An audit trail of transactions is created from input through processing to the output stage of the system.

Batch control is not exclusively an input control technique. Control the batch continues through all phases of the system.

(ii) **Check Digits :-** One method for detecting data coding errors is a check digit. A check digit is a controlled digit (or digits) added to the code when it is originally assigned that allows the integrity of the code to be established during subsequent processing. The check digit can be located anywhere in the code, as a prefix, a suffix or embedded someplace in the middle. Whenever the code is transcribed from one document to another this checks is to be effected

(iii) **Run to Run control :-** The preparation of batch control figures was previously discussed as an element of input control. Run to Run controls use batch figures to monitor the batch as it moves from one programmed procedure (run) to another. These controls ensure that each run in the system processes the batch correctly and completely. Batch control figures may be contained in either a separate control record created at the data input stage or an internal label.

(iv) Audit Trail control :- The provision of an audit trail is an important objective of process control. In an accounting system, every transaction must be traceable through each stage of processing from its economic source to its presentation in financial statements. In a Computer Based Information System (CBIS) environment, the audit trail can become fragmented and difficult to follow. It thus becomes critical that each major operation applied to a transaction be thoroughly documented.

(v) Tape and Disk O/p Control :- Computer output to magnetic tapes and disks is not normally verified by direct human observation as is the case with manually printed output. Hence, special care must be taken to ensure accuracy in encoding of information on these output media. It may be noted that the disk drives and tape drives have built-in dual recording mode to enable these machines to check on recording accuracy. It works as follows :

The disk/tape is encoded with the desired information, this information is read again using the reading mechanism of the tape or disk drive. A comparison is made to verify the original output. In most cases, the comparison of the initial output data with the newly recorded data will result in a confirmation of identical information, and the tape or disk system is then able to signal the CPU that the required writing operation has been successful. In such instances, either a second writer attempt can be initiated, or computer operator notifies for alternative action.

Use of file labels can be treated as an output control in case of tape and disk files. The file label processing requires the updating of information in trailer record to reflect the new status of the file.

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CHAPTER -15**Q-32 Why is there a rise in Internet Computer Frauds? Give some examples of Internet Frauds ?**

Ans : Organization that track computer that 80% of business have been victimized by at least one incident of computer fraud. However, for the following reasons no one knows for sure exactly how many companies loose to computer fraud.

1. Not everyone agrees on what constitute computer fraud. For example, some people restrict the definition to a crime that takes place inside a computer or is directed at it. For other it is any crime where the perpetrator uses the computer as a tool . many people do not believe that making an unlicensed copy of software constitute computer fraud. Software publishers however, think otherwise.
2. many computer fraud go undetected. It is estimated that only 1% of all computer crime is detected.
3. 80-90 % of the frauds data that are uncovered are not reported. Only the banking industry is required by law to reportb all frauds. The most common reason for failure to report computer fraud is a company's fear that adverse publicity would result in copycat fraud and loss of customer confidence that would cost more than the fraud itself.
4. Most networks have a low level of security. It is estimated that two out of three sides have serious vulnerabilities, and most firewalls and other protective measures at the sites are ineffective.
5. Many internet pages give step by step instructions on how to perpetrate computer frauds and abuses. There are thousands of pages on how to break into routers and disable web servers.
6. Law enforcement is unable to keep up with the growing number of computer frauds.

Few Examples of Internet Frauds :-

1. In 1997 the US Federal Trade Commission began litigation against a company called "Fortuna Alliance" which had an internet site. This company offered investors a return of \$ 5000 per month for an investment of & 250. it might be thought that no one would be fooloish enough to invest in such an improbable scheme but in fact investors lost about \$6 million before the FTC blocked access to the site.
2. In August 1997, the European Union bank which, traded over the Internet, collapsed. It was registered in Antigua and had been founded by two Russians in 1994. the site claimed that it offered a \$ 1 million certificate of deposit that paid interest of 9.91%. it had attached attracted unfavourable comment by the bank of England some time before it collapsed.

3. Offshore trusts are mainly an American problem. Internet sites and bulk email schemes promises freedom from US taxes if victims transfer their assets to an offshore trust and pay a handsome fee. What happens is that the fraudsters either decamp with the fees (often thousands of dollars) or set up the trusts and make themselves beneficiaries, thus all the victims assets vest in them.

Q-33 Discuss Categories of Computer Frauds based on data processing model?

Ans :- Various studies have examined fraud to determine the type of assets stolen and the approaches used by employees to commit computer fraud. One way to categories computer frauds is to use the data processing model: input, processor, computer instructions, stored data and output.

1. Input :- The simplest and most common way to commit a fraud is to alter computer input, it requires little, if any, computer skills, instead, perpetrator needs only to understand how the system operates so that they can cover their tracks.

Collusive fraud- one perpetrator opens an account at a bank, and then prepared blank deposit slip. The slips were similar to those available in bank lobby, except that his account number was encoded on them. One morning he replaced all the deposit slips in the bank lobby with his forged ones, for three days all bank deposits using the forged slips directly into his account. After three days the perpetrator withdrew the money and disappeared. He used an alias: his identity was never uncovered nor was he ever found.

Disbursement fraud- The perpetrator causes a company either pay too much for ordered goods or to pay for goods that were never ordered. One perpetrator used a DTP package to prepare fraudulent bills for office supplies that were never ordered, then mailed those bills to companies across the country. The perpetrator kept the amount low enough so that most companies did not bother to require purchase orders or approvals. An amazingly high percentage of the companies paid the bills without question.

Payroll frauds- Perpetrators can enter data to increase that salary, create fictitious employee, or retain a terminated employee on the records. Under the latter two approaches, the perpetrator proceeds to intercept and cash the illegal cheques.

Cash receipt frauds – the perpetrator hides the theft by falsifying system input. For example, an employee at the Arizona Veteran's Memorial Coliseum sold customers full price tickets, and pocketed the difference.

2. Processor :- Computer fraud can be committed through unauthorized system use, including the theft of computer time and services. For example, some companies do not permit employees to use company computers to keep personal or outside business records. Violating this policy would constitute a fraud. While most people would not call it fraud employee, goofing (surfing the internet for personal entertainment on company time) has become a serious problem at many companies. One study estimates that employees with access to the internet, on average, lose one to two hours of productivity a week goofing.

3. Computer Instructions :- Computer fraud can be accomplished by tempering with the software that processes company data. This may involve modifying the software that processes company data. This may involve modifying the software, making illegal copies, or using it in an unauthorized manner. It might also involve developing a computer fraud used to be one of the least common, because it requires a specialized knowledge about computer programming that is beyond the scope of most users. Today, however, such frauds are much more frequent because there are many web pages with instructions on how to create viruses and other computer instruction based schemes.

4. Data :- Computer fraud can be prepared by altering or damaging a company's data files or by copying, using, or searching them without authorization. There have been numerous instances of data files being scrambled, altered or destroyed by the disgruntled employees. In one instance, an employee removed all the external labels from hundreds of tape files. In another case, an employee used a powerful magnet to scramble all the data on magnetic files.

Data can also be destroyed, changed or defaced- particularly if saved in company website.

5. Output :- Computer fraud can be carried out by stealing or misusing system output, system output is usually displayed on monitors or printed on paper. Unless properly safeguarded, monitor and printer output is subject to pry eyes and unauthorized copying.

6. Malicious alterations of email :- This can happen when an employee has a grudge against another member of staff or management. The effects can be troublesome, if not damaging.

Q-34 Discuss various measures that can reduce potential for computer frauds?

Ans: Because fraud is such a serious problem, organization must take every precaution to protect their information systems. A number of measures can significantly decrease the potential for fraud and any resulting losses.

(a) Make fraud less likely to occur: Some computer consultants claim that the most effective method of obtaining adequate system security is to rely on the integrity of company employees. At the same time, research shows that most frauds are committed by current and former employees. Thus employees are both the greatest control strength and weakness. Organizations can take steps to increase employee integrity and reduce the likelihood of employees committing a fraud.

(b) Use proper hiring and firing practices: A manager's most important responsibilities is to hire and retain honest people. Similarly a company should be very careful when firing employees. Dismissed employees should be removed from sensitive jobs immediately and denied access to the computer system to prevent sabotage or copying confidential data before they leave.

(c) Manage disgruntled employee:- many employees who commit fraud are seeking revenge or "injustice" for some wrong they perceive has been done to them. Hence companies should have procedures for identifying these individuals and either helping them resolve their feelings or removing them from jobs with system access.

(d) Train employees in security and fraud prevention measures : many top executives believe that employee training and education is the most important element of any security program. Fraud is much less likely to occur in an environment where employees believe security is everyone's business.

To develop this type of culture a company should educate and train employees in the following areas.

(i) Security measures : Employees should be well schooled in security measures, taught why they are important , and motivated to take them every seriously

(ii) Telephone Disclosure : Employees should be taught to not give out confidential information over the telephone without knowing for sure who is calling. The employees can be taught tactics such as dialing the caller back and verifying a person's identity by asking penetrating and specific questions that only they would be able to answer.

(iii) Ethical Consideration : The company should promote its ethical standards in its practices and through company literature such as employee handouts. Acceptable and unacceptable behaviour should be defined so that employees are aware of a company's ethical position should a problem arise.

(iv) Punishment for unethical behaviour : Employees should be informed of the consequences of unethical behaviour (reprimands, dismissal, prosecution, etc.). this information should be disseminated not as a threat but as the consequence of choosing to act unethically. For example, employees should be informed that using a computer to steal or commit fraud is federal crime and anyone so doing faces immediate dismissal and/or prosecution.

(v) Educating employees in security issues, fraud awareness, ethical considerations, and the consequences of choosing to act unethically can make a tremendous difference.

(vi) Fraud awareness : Employees should be made aware of fraud, its prevalence, and its dangers. They should be taught why people commit fraud and how to deter and detect it.

(vii) Manage and track software Licenses: software licenses management, a fast growing area of information technology management, helps companies make sure they comply with all their software licenses. Of key concern is making sure there are enough licenses to met user demands and that there are not more users than licenses. This protects them from software piracy lawsuits. It can also save the company money ensuring that it does not pay for more licenses than they actually use or need.

(viii) Require signed confidentially agreements : all employees vendors, and contractors should be required to sign and abide by a confidentiality agreement.

Q-35 What kinds of control can be incorporated in the system to make frauds difficult to perpetrate?

Ans : One way to deter fraud is to design a system with sufficient controls to make fraud difficult to perpetrate. These controls help ensure the accuracy, integrity and safety of system resources.

(i) Develop a strong system of internal controls : The overall responsibility for a secure and adequate controlled system lies with top management. Managers typically delegate the design of adequate control systems to systems analysts, designers and end users. The corporate information security officer and the operations staff are typically responsible for ensuring that control procedure are followed.

(ii) Segregate Duties : There must be an adequate segregation of duties to prevent individuals from stealing assets and covering up their tracks.

(iii) Require vacations and rotate duties : many fraud schemes, such as lapping and kiting, require the ongoing attention of the perpetrator. If mandatory vacations were coupled with a temporary rotation of duties, such ongoing fraud schemes would fall apart.

(iv) Encrypt Data and program : Another way to protect data is to translate it into a secret code, thereby making it meaningless to anyone without the means to decipher it.

(v) Restrict access to computer equipment and data files : Computer fraud can be reduced significantly if access to computer equipment and data files is restricted. Physical access to computer equipment should be restricted, and legitimate users should be authenticated before they are allowed to use the system.

(vi) Protect telephone lines : Computer hackers (called phreakers when they attack phone system) use telephone lines to transmit viruses and to access, steal and destroy data. One effective method to protect telephone lines is to attach an electronic lock to them.

(vii) Protect the system from viruses : There are hundreds of thousands of viruses attacks every year, and an estimated 90% of the PCs that suffer a virus attack are re infected within 30 days by the same virus or some other virus. A system can be protected from viruses.

Fortunately, some very good virus protection programs are available. Virus protection programs are designed to remain in computer memory and search for viruses trying to infiltrate the system. Make sure that the latest version of the anti-virus programs are used.

CHAPTER-16**Q-36 Write short note on –**

- (i) E Governance**
- (ii) Duties of subscribers**
- (iii) Duties of C.A.**
- (iv) Appellate Tribunal**

Ans :

(i) E Governance :- Section 6 lays down the foundation of Electronic Governance. It provides that the filing of any form, application or other documents, creation, retention or preservation of records, issue or grant of any license or permit or receipt or payment in Government offices and its agencies may be done through the means of electronic form. The appropriate Government has the power to prescribe the manner and format of the electronic records and the method of payment of fee in that connection.

Section 7 provides that the documents, records or information which has to be retained for any specified period shall be deemed to have been retained if the same is retained in the electronic form provided the following conditions are satisfied :

the information therein remains accessible so as to be usable subsequently.

The electronic record is retained in its original format or in a format which accurately represents the information contained.

The details which will facilitate the identification of the origin, destination, dates and time of dispatch or receipt of such electronic records are available therein.

Section 8 provides the publication of rules, regulations and notifications in the electronic gazette. It provides that where any law requires the publication of any rule, regulation, order, bye law, notification or any other matter in the official gazette, then such requirement shall be deemed to be satisfied if the same is published in an electronic form. It also provides where the official gazette is published both in the printed as well as in the electronic form, the date of publication shall be the date of publication of the official gazette which was first published in any form.

(ii) Duties of subscribers :-

On acceptance of the digital signature certificate the subscriber shall generate a key pair using a secure system.

A subscriber shall be deemed to have accepted a digital signature certificate if he publishes or authorizes the publication of such signature to one or more persons or otherwise demonstrates his approval of the digital signature certificate. By so accepting the certificate, the subscriber certifies to the public the following.

(a) that he holds the private key corresponding to the public key listed in the digital signature certificate, and

(b) that all the information contained in the certificate as well as material relevant to them are true.

The subscriber shall exercise all reasonable care to retain control of his private key corresponding to the public key. If such private key has been compromised (i.e. endangered or exposed) the subscriber must immediately communicate the fact to the certifying authority.

(iii) Duties of Certifying Authority :-

This section provides that every certifying authority shall follow certain procedure in respect of digital signature as given below :-

make use of hardware, software, and procedure that are secure from intrusion and misuse
provide a reasonable level of reliability in its services which are reasonably suited to the performance of intended functions.

Adhere to security procedures to ensure that the secrecy and privacy of the digital signatures are assured and

Observe such other standards as may be specified by regulations.

Every certifying authority shall also ensure that every person employed by him complies with the provisions of the act, or rules, regulations or order made there under.

A certifying authority must display its license at a conspicuous place of the premises in which it carries on its business and a certifying authority whose license is suspended or revoked shall immediately surrender the license to the controller.

Section 34 further provides that every certifying authority shall disclose its digital signature certificate which contains the public key corresponding to the private key used by that certifying authority and other relevant facts.

(iv) Appellate Tribunal :-

The “Cyber Regulation Appellate Tribunal” has appellate powers in respect of orders passed by any adjudicating officer. Civil courts have been barred from entertaining any suit or proceedings in respect of any matter which an adjudicating officer or tribunal is empowered to handle.

Section 48 provides for establishment of one or more appellate tribunals to be known as Cyber Regulation Appellate Tribunals.

The Cyber Regulation Appellate Tribunals shall consist of one person only (called the presiding officer of the tribunal) who shall be appointed by notification by the central government. Such a person must be qualified to be a judge of a high court or is or has been member of the Indian legal services. In the post in Grade I of that services for at least three years.

The presiding officer shall hold office for term of five years or up to a maximum age limit of 65 years , which ever is earlier.

Section 52 provides for the salary and allowances and other terms and conditions of services of the presiding officer.

Service 53 provides that in the situation of any vacancy occurring in the office of the presiding officer of Cyber regulation Tribunal. The Central Government shall appoint another person in accordance with the provision of this act.

Q-37 What are advantages of digital signature technique for analysis of financial information?

Q-38 Write short note on Key Figure ?

Ans- Profitability analysis system uses the concept of key figures to define the lowest level at which it is possible to display the quantities, revenue, sales deductions and costs when a contribution margin calculation for a business segment is carried out. The system offer lists of commonly used key figures as proposals to adopt or supplement by key of one's own specification.

These key figures can be set at any level of detail. Revenue for example can be displayed across a revenue element structure consisting of revenue from external customers and partner companies. Revenue alternations, such as credit memos, rebates and sales deductions can be displayed as separate revenue elements.

Costs are stored as value fields. The details depend on the specific R/3 applications that are installed and configured.

Q-39 Discuss the civil & criminal offences and the related penalties provided under I T Act. ?

Ans. Chapter XI deals with some computer crimes and provides for penalties for these offences. It contains section 65 to 78

Tampering with computer source documents (section 65)

This section provides for punishment with imprisonment upto three years or with a fine which may extend to Rs. 2 lakhs or with both whoever knowingly or intentionally tampers with the computer code source documents.

“Computer source code” means the listing of programmes, computer commands, design and layout and programme analyses of computer resources in any form.

Hacking with computer system : (Section 66)

Hacking is a term used to describe the act of destroying or deleting or altering any information residing in a computer resources or diminishing its value or utility, or affecting it injuriously in spite of knowing that such action is likely to cause wrongful loss or damage to the public or that person. Section 66 provides that a person who commits hacking shall be punished with a fine upto Rs. 2 Lakhs or with imprisonment upto 3 years, or with both.

Publishing of Information which is obscene in electronic form (Section 67)

Section 67 provides for punishment to whoever transmits or publishes or causes to be published or transmitted, any material which is obscene in electronic form with imprisonment for a term which may extend to five years and with fine which may extend to Rs . 1 Lakh on first conviction. In the event of second or subsequent conviction the imprisonment would be for a term which may extend to ten years and fine which may extend to rs. 2 laks

Penalties for damage to computer, computer system or network

Section 43 deals with penalty for damage to computer, computer system etc. By any of the following methods :

securing access to the computer, computer system or computer network.

Downloading or extracting any data, computer database or information from such computer system or those stored in any removable storage medium.

Introducing any computer contaminant or computer virus into any computer. Computer system or network

Damaging any computer, computer system or network or any computer data, database or programme

Disrupting any computer, computer system or network

Denying access to any person authorized to access any computer, computer system or network

Providing assistance to any person authorized to access any computer, computer system or network in contravention of any provisions of this act or its rules.

Charging the services availed of by one person to the account of another person by tampering with or manipulating any computer, computer system or network.

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CHAPTER – 17**Q-40 Why do manual audit methods prove ineffective in Information System Audit?**

Ans The audit methods that are effective for manual audits prove ineffective in many IS audits because of these factors.

Electronic evidence – Essential evidence is not physically retrievable by most auditors, and it is not readable in its original electronic form.

Terminology- The tools and techniques used in automated applications are described in terms that are difficult for the non-EDP auditors to understand

Automated processes- The methods of processing are automated rather than manual, making it difficult for the non-EDP auditor to comprehend processing concepts and the logic of these concepts.

New risks and controls – Threats to computer systems and the countermeasures to those threats (i.e. controls) are new to non EDP auditors, and the magnitude of the risks and the effectiveness of the controls are not understood.

Reliance on controls – In manual system, the auditor can place some reliance on hard-copy evidence, regardless of the adequacy of the controls. Whereas, in automated systems, the electronic evidence is only as valid as the adequacy of controls.

Because the rate of these changes varies among systems in organizations. The methods and approaches of auditing automated information systems differ among applications and organizations. For example, some organizations still rely heavily on hard copy evidence, and others have eliminated much of it.

Q-41 Briefly discuss the framework for audit of-

(a) Program Development

(b) Data file control

Ans :

(a) Program Development:-Table 2 provides a framework for reviewing and evaluating the program development process. Two things can go wrong in program development :

(1) in advertent errors due to misunderstanding system specifications or careless programming, and

(2) unauthorized instructions deliberately inserted into the programs. These problems can be controlled by requiring both management and user authorization and approval, through testing, and proper documentation.

Table 2 Frame work for Audit of program Development*Types of Errors and Fraud*

- Inadvertent programming errors.
- Unauthorized program code

Control Procedures

- Management authorization for program development and approval of programming specifications.
- User approval of programming specifications
- Thorough testing of new programs
- User acceptance testing
- Complete systems documentation, including approvals

Audit Procedures : System Review

- Independent and concurrent review of the systems development process.
- Review systems development policies and procedures
- Review systems authorization and approval procedures
- Review programming evaluation standards
- Review program documentation standards
- Review program testing and test approval procedures
- Discuss systems development procedures with management, system users, and IS personnel
- Review final application system documentation.

Audit Procedures : Tests of Control

- Interview users about their involvement in systems design and implementation
- Review minutes of development team meetings for evidence of involvement
- Verify management and user sign-off at milestone points in the development process
- Review test specifications, test data and results of system tests

Compensating Controls

- Strong processing controls
- Independent processing of test data by auditor.

The auditor role in system development should be limited to an independent review of systems developments activities. To maintain the objectivity necessary for performing an independent evaluation function, auditors should not be involved in developing the system. During the system review, auditors should gain an understanding of development procedures by discussing them with management, system users and IS personnel. They should also review the policies, procedures, standards and documentations listed in Table 2.

To test system development controls, auditors should interview managers and system users, examine development approvals and review thoroughly all documentation relating to the testing process and ascertain that all program changes were tested. The auditor should examine the test specifications, review data and evaluate the test results. If unexpected test results were obtained, the auditor should ascertain how the problem was resolved.

Strong processing controls (see objective 4) sometimes can compensate for inadequate development controls. If compensatory processing controls are relied on, the auditor should obtain persuasive evidence of compliance, using techniques such as independent processing of test data. If this type of evidence can not be obtained, the auditor may have to conclude that a material weakness in internal control exists and that the risk of significant errors or fraud in application programs is unacceptably high.

(b) Data file control;– The sixth objective is concerned with the accuracy, integrity and security of data stored in machine readable files. Data storage risks include the unauthorized notification, destruction or disclosure of data. Many of the controls discussed in Chapter 14 are used to protect the system against these risks. If file controls are seriously deficient, especially with respect to physical or logical access or to backup and recovery procedures, the auditor should strongly recommend they be rectified. Table 6 summarizes the errors, controls and audit procedures for this objective.

The auditing by objectives approached is a comprehensive, systematic and effective means of evaluating internal controls in an AIS. It can be implemented using an audit procedures checklist for each objective. The checklist should help the auditor reach a separate conclusion for each objective and suggest compensating controls when an objective is not fully achieved. A separate version of the checklist should be completed for each significant application.

Auditors should review system designs while there is still time to adopt their suggestions for controls and audit features. Techniques like ITF, snapshots, SCARF, audit hooks and real time notifications should be incorporated into a system during the design process, rather than as an afterthought. Similarly, most application control techniques are easier to design into the system than to add after the system is developed.

Table 6 : Frame work for Audit Of Data Controls

Types of errors and fraud

- Destruction of stored data due to inadvertent errors, hardware or software malfunctioning and intentional acts of sabotage or vandalism.
- Unauthorised modification or disclosure of stored data.

Control Procedures

- Secure file library and restrictions on physical access to data files.
- Logical access controls using passwords and access control matrix
- Proper use of file labels and write protection mechanism
- Concurrent update controls
- Use of data encryption for highly confident data
- Use of virus protection software
- Maintenance of backup copies of all data files in all off site location
- Use of checkpoint and rollback to facilitate system recovery.

Audit Procedures : System Review

- Review documentation for functions of file library operation
- Review logical access policies and procedures
- Review operating documentation prescribed standards for
 - Use of file labels and write protection mechanisms
 - Use of virus protection software
 - System recovery, including checkpoint and rollback procedures.
- Review systems documentation to examine prescribed procedures for
 - Use of concurrent update controls and data encryption
 - Control of file conversion.
 - Reconciling master file totals with independent control totals

- Examine disaster recovery plan
- Discuss data file control procedures with IS managers operators.

Audit Procedures : Test of Controls

- Observe and evaluate file operations
- Review records of passwords assignment and modifications.
- Observe and evaluate file handling procedures by operations personnel
- Observe the preparation and off-site storage of backup files.
- Verify the effective use of virus protection procedures.
- Verify the use of concurrent update controls and data encryption.
- Verify completeness, currency and testing of disaster recovery plan.
- Reconcile master file totals with separately maintained control totals.
- Observe the procedures used to control file conversion.

Compensating Controls

- Strong user controls
- Effective computer security controls
- Strong processing controls.

Auditors use an **input control matrix** to document the review of source data controls. The matrix shows the control procedures applied to each field on an input record.

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CHAPTER 18

Q-42 What is information security? Why is it important? Also explain the factors that should be considered while deciding about the level of protection needed?

Ans Security relates to the protection of valuation assets against loss, disclosure or damage. Security valuable assets from threats, sabotage or natural disaster with physical safeguards such as locks, perimeter fences and insurances is commonly understood and implemented by most organizations. However security must be expanded to include logical and other technical safeguards such as user identifiers, Passwords, firewalls etc. which are not understood nearly as well by organizations as physical safeguards. This concept of security applies to all information. In this context, the valuable assets are the data or information recorded, processed, stored, shared, transmitted, or retrieved from an electronic medium.

Why is information security important :-

In a global information society, where information travels through cyberspace on a routine basis, the significance of information is widely accepted. In addition, information and the information systems and communications that deliver the information are truly pervasive throughout organizations-from the user's platform to local and wide area networks to servers to mainframe computers.

Security failures may result in both financial losses and/or intangible losses such as unauthorized disclosure of competitive or sensitive information.

Threats to information systems may arise from intentional or unintentional acts and may come from internal or external sources. The threats may emanate from, among others technical conditions (program bugs, disk crashes), natural disaster (fires, floods), environmental conditions (electrical surges), human factors (lack of training, errors and omissions), unauthorized access (hacking), , or viruses. In addition to these, other threats, such as business dependencies (reliance on third party communications carriers, outsourced operations, etc.) that can potentially result in a loss of management control and oversight are increasing in significance.

Adequate measures for information security help to ensure the smooth functioning of information systems and protect the organization from loss or embarrassment caused by security failures.

Establishing better information protection :-

Processing information is crucial to the overall success or failure of a company. Businesses hold such a vast array of data, what steps do they need to take to keep all of their critical information protected? These points may be considered :

- **Not all data has the same value** And as such, the information may be handled and protected differently. Organization must determine the value of the different types of information in their environment before they can plan for the appropriate levels of protection.

- **Know where the critical data resides** In today's business environment, this is normally the company's information system infrastructure. Because each piece of information may require different levels of protection, identifying where each is located enables an organizations to establish an integrated security solution. This approach also provides significant cost benefits, as the company does not need to spend more on protecting data than the data itself is worth.
- **Develop an access control methodology**, Information does not have to be removed to cause damage or to have financial impact. Information that is inadvertently damaged or copied without the knowledge of the owner may render the data useless. To guard against this, organizations must some type access control methodology. For important data, this access control (and the associated auditing) should be extend to the file level.
- **Review hardcopy output** , The hardcopy output of employees' daily work should also be reviewed. Although strategic plans in their final forms may be adequately protected, what measures are used to safeguard all drafts and working papers? What information is regularly placed in the recycle or trash containers without thought to its value?

Q-43 Discuss various types of information protection ?

Ans : There are basically two types of protection that an organization can use: preventive and restorative

1. Preventive Information Protection : This type of protection is based on use of security controls. Information security controls are generally grouped into three types of control: Physical, Logical and administrative. Organizations require all three types of controls. The organization's information security policy through the associated information security standards documentation mandates use of these controls. Here are some examples of each type of control :

- Physical : Doors, Locks, Guards, Floppy Disk access Locks, Cables locking systems to desks/walls. CCTV, paper shredders, fire suppression systems.
- Logical (Technical) : Passwords, File permission, Access control lists, Account Privileges, Power protection systems
- Administrative : Security awareness, uses account revocation, policy

2. Restorative Information protection : Planning and operating an effective and timely information backup and recovery program is vital to an operation. Information backup does not simply involve backing up " just the valuable information" but it frequently also means backing up the system as well. Since the information may need services that the system provides to make the information usable.

The key requirement of any restorative information protection plan is that the information can be recovered. This is frequently an issue that many organizations fail to properly address.

Here are few questions any restorative information protection program must address.

- Has the recovery process been tested recently?
- How long did it take?
- How much productivity was lost?

- Did everything go according to plan?
- How much extra time was needed to input the data changes since the last backup?

3. Holistic Protection :- Protecting corporate information from harm or loss is not an easy task. Protection must be done holistically and give the organizations the appropriate level of security at a cost that is acceptable to the business. One must plan for the unexpected and unknown, expect the worst events to happen. And recover from these events if and why they occur as though nothing ever happened.

Q 44 Explain Information Security Policy (Contents and Implementation)

Ans :

Q-45 What are the levels of CASE Tools and integration ?

Ans: Specialized CASE tools can be combined together to provide a wider support to software process activities. An effective integration for framework makes evolution possible as new systems are added without distributing the existing systems. In systems engineering environment, there are five different levels of integration of CASE tools which are possible

Let us examine each of these tools in detail.

1. Platform Integration : Platform integration means that the tools or work benches to be implemented run on the same platform where platform means either a single computer/operating system or a network of systems.

2. Data Integration : Data integration is the process of exchange of data by CASE tools. The result from one tool can be passed on as input to another tool.

There are a number of different levels of data integration :

(a) Shared File All tools recognize a single file format. The most general purpose shareable file format is where files are made of lines of characters.

(b) Shared data structure The tools make use of shared data structures which usually include program or design language information.

(c) Shared Repository The tools are integrated around an object management system which includes a public share data describing the data entities and relationship which can be manipulated by the tools.

3. Presentation Integration:- Presentation or user interface integration means that the tools in the system use a common metaphor or style and a set of common standards for user interaction.

There are three different levels of presentation integration .

(a) Window system integration Tools which are integrated at this level use the same underlying window system and present a common interface for the window manipulation commands.

(b) Tools which are Integrated at this level use the same form of commands for comparable functions.

(c) Interaction Integration This is related with a direct manipulation interface where the user interacts with a graphical or textual view of the entity.

4. Control Integration:- Control Integration is the mechanism of one tool in a workbench or environment to control the activation of other tools in the CASE system. The tool is able to start and stop other tools. The tool can also call the sources of another tool in the system. These services are accessed through program interfaces.

5. Process Integration :- Process Integration means that the CASE system has embedded knowledge about the process activities, their planning, their constraints and the tools needed to support their activities. The CASE system participates in the scheduling of these activities and in checking that the required activity reference is maintained.

Q-46 Discuss the components of programming work benches?

Ans : Programming work benches is made up of a set of tools to support the process of program development. Some of these tools which are part of a programming work bench are :

(a) Language compiler Translates host programs to object code. As part of a translation process, an abstract syntax tree and a symbol table is created.

(b) Structure editor Incorporates embedded programming language knowledge and edits the syntax representation of the program in the AST rather than its source code text.

(c) Linker Links the object code program with components which have already been compiled.

(d) Loader Loads the executable program into the computer memory prior to execution.

(e) Cross referencer Produces a cross referencer listing showing where all program names are declared and used.

(f) Pretty printer Scans the AST and prints the source program according to embedded formatting rules.

(g) Static analyzer Analyses the sources code to discover anomalies such as uninitialized variables. Unreachable code, uncalled functions and procedures etc.

(h) Dynamic analyzer Produces a source code listing annotated with the number of times each statement was executed when the program was run. It may also generate information on program information on program benches and loops and statistics of processor usage.

(i) Interactive debugger Allows the user to control the execution sequence and view the program state as execution progresses.

Q-47 Explain the features of analyses & design work benches?

Ans Analyses and design work benches are designed to support the analyses and design stages of the software process where models of the system are created. The components of this model are

- (a) *Diagram editors* to create data flow diagrams, structured charts, entity relationship diagram and so on.
- (b) *Design analyses and checking tools* which process the designs and then submit report on errors and anomalies. These are integrated with editing system so that user errors are trapped at an early stage in the process.
- (c) *Repository query languages* which allows the designer to find the designs and associates design information in the repository.
- (d) *A data dictionary* Which maintains information about the entities used in a system design.
- (e) *Report definition and generation tools* which take information from the central store and automatically generate system documentations.
- (f) *Forms definition tools* which allow screen and document formats to be specified.
- (g) *Import Export Facilities* which allow the interchange of information from the central repository with other development tools.
- (h) *Code generators* which generate code or code skeletons automatically from the design captured in the central store.