Management Information & Control Systems

For CA Final

Objective of this notes is to make study & revision More Comfortable

This notes Has Been Prepared On The Basis Of Intitute's Study Material.

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This notes has been prepared primarily & exclusively from the point of view of exams.

MICS is a subject where scoring high marks, mainly a exemption is necessary, which leads to clearing the whole group by becoming the contributing factor of needed aggregate marks.

Study material should be the main source for studying this particular paper. While preparing for exams from study material see that this notes comply with the points of study material and pen down some key words against each point in this notes. Which helps in revising during the exams.

I hope that this notes shall help u in all way to score very good marks in the exam.

Chapter - 1

Basic Concepts of System

System

- Definition — elements - integrated - collectively - common objective
- Features
- Examples — organisation - computer based information system
- Theme

System Environment

- Meaning — elements - outside - surround the system - interaction

Boundary

- Meaning — define & separate

Classification of System

- Abstract — logical description
- Physical; — physical description

Types of System

- Deterministic System — predictable - calculator
- Probabilistic System — probable - human
- Closed System — self contained - govt
- Open System — not self contained - govt
- Relatively closed system — as close as possible - computer program

Subsystem

- Meaning — subsystem - boundaries - inteface
- Example

Supra System

- Meaning — entity - equilavent systems

Principles / Methods of Building Systems from Subsystems

- Decomposition
- Simplification
- System Entropy — need neg ent - input of matter / energy
- System stress and System change
  - System — artificial - living - org - inf systems
  - Stress — force from supra
  - Types of stress — goals - achievement level
  - Consequences of stress — pathological - change
  - Process of adaptation — change
  - Types of change — structural - procedural change

Information

- Meaining — relthnshp to data - information - action / decision

Characteristics of Information

TQM-F-P-RRR

- Timeliness
- Purpose
- Mode and Format
- Redundancy
- Rate
- Frequency
- Reliability
- Quality

BIS : Business Information System

- Meaning — bus depend on inf systems - purpose of BIS - process input - maint record - prd information
- Categories of BIS
  - TPS
  - MIS
  - DSS
  - EIS
  - ES

Chapter - 2

Transaction Processing System

Every Organisation we have

AIS	collection of TPS
TPS	collection of App system of each dept
Application system	Carryout individual bus activities

Types of Common Cycle in Business Activities

Revenue cycle	sales - receipt of money
Expenditure cycle	purchase - make pymt
Production Cycle	RM - to - FG
Finance Cycle	Procurement - effective utilisation
Financial Reporting cycle	use above data to prepare financial statements

AIS

TPS

Components of TPS

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- Inputs
- Processing
- Storage
- Output

Chapter - 3

Basic Concepts of MIS

Management Information System

Management	Activities	POCE - planning - organising - controlling - evaluating
	Requirement	for above require information - given by MIS
	MIS	identify - collect - process - disseminate
Information	Refer chapter 1	
system	Refer chapter 1	

Characteristics of MIS / Designing of Effective MIS

Management oriented	levels of management
Management directed	mngt should provide
Common dataflow	I - P - O
Common database	elimination - access list
Subsystem	by decomposition
Integrated	by simplification
Heavy planning	time - cost - avoid absolescence
Computerised	TOOL - accuracy - consistency - reliability - effective - efficient - speed

Misconceptions / Myths of MIS

It is use of computers	factors - big - complex - frequency
More data - more information	quality : req - mode - form
Accuracy in reporting - Vital importance	depend on level of mngt

Prerequisites / 5 pillars of Effective MIS

Database	Characteristics
Qualified officers	mngt experst - system experts
Support from management	how to obtain
Control and mainatinence of MIS	avoid shortcuts - fine tuning
Evaluation of MIS	to meet future requirements

Effects / impact of using computer for MIS

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- Speed
- Scope of use of information
- Scope of analysis
- System design & System operation
- Integration of subsystem
- Increase the effectiveness of MIS

Limitations of MIS

- Depends on Input
- Only a tool
- Non flexible
- Non support
- Information hoarding & Non sharing
- Structured changes in organisation

What information is required in Management decision making process

Environmental information
- Government policies
- Political setup
- Economic trends — GDP - per capita - disp income - emp level
- Technological facts
- Factors fo production — RM - labour - land - capital - domestic condition

Competitive information
- Industry demand — product - area : by industry
- Demand of products of the company — demand - capacity of co. product
- Competitive data — plans - decisions

Internal information — to exercise control over functional area -

Factors on which information requirements depend

Operational Function
- Meaning — inf req depends on operational function
- Information of diff op function vary in
  - Content — depends on activities performed
  - Characteristics — levels of accuracy - rates on transmission

Types of decision making
- Programmed decision making
  - Meaning — procedures - techniques - rules
  - Characteristics
- Non - programmed decision making
  - Meaning — mng intelligence - experience - judgemnt - descrition
  - Characteristics

Level of management
- Strategic level — macro level - non prog - critical to success
- Tactical level — opertn dec - prog dec - single SLD lead to more than one TD
- Supervisory level — SL & TL to actions - Tasks carried out eff & efficiently

Chapter - 4
System Approach & Decision making

Systems approach to decision making
- Meaning

Steps involved in Systems approach to problem solving

Step 1	Define the problem / oppurtunity	power cut
Step 2	Collect all relevant data	internal - external - impact
Step 3	Identify the alternate solutions	generator - sub cont - reject order - alt power
Step 4	Evaluate the alternatives	gnerator - yes
Step 5	Selecting the best alternative	Generator - buy / hire
Step 6	Implementing the solution	implement - evaluation

Nature and meaning of decision making

Meaning	process & funtn - choosing action - of sev alt - for ach goals	
Nature	reduce gap b/w - existing & desired	
Features	Achieving organisation goals	bus - diversification - product - range
	Painful decisions	reduce : staff- optn - officer - product - winding up
	Crisis decisions	

Pervasiveness of Decision making / Creating DMS
- Decision making
- Responsibility of Top managers

Classifications of Decisions

Programmed decisions	
Unprogrammed decisions	
Strategic Decisions	
Tactical decisions	
Individual decisions	full resp - top to bottom - prvd inf - cannot delegate
Group decisions	collectively - Formal : higher - lower - Informal

Functional information system
- Finance and accounting
- Production
- Marketing Personnel

Finance and accounting system

Finance	organise finance - grant credit - collection - cash mngt	
Accounting	record - classify - sumerise into BOA - to - FS	
Finance decision making		
	Procurement of funds	LT - ST - Characteristics
	Effective utilitsation of funds	LT - ST
Financial information system		
	Internal environemnt	sales - purch - Fa - stock - labour - GL - TB - FS
	External environment	Tax - co law - SH - debentures - emplyee - customers - suppliers

Financial decisions

Estimation of requirement of funds	how much - what time
Capital structure decisions	LT - ST - Debt & equity
Capital budgeting decisions	evaluate alt - feasibilty of invst
Profit planning	retention - dividend
Tax management	take adv of - exemp - ded - rebate - allow
Working capital management	finance of CA - to day to day activities
Current asset management	credit policy - invt policy

Maketing system

Sales management — imp slaes to inc profit

Sales support information system	prod - price - dis - incent - promo - inv level -
Sales analysis information system	sales trend - prod profit - perf of s.person - reg brnh
Market research and intelligence	new mkt - new prod - economy trend - sales trend
Advertising and promotion	ltd budget - meet obj of sales mngt
Product development and planning	oppurtunity - feasibilty - development
Product pricing system	full cost / marg cost - other factors
Customer service	tech assistance - product maintainance

Information requirement of Marketing system

Environmental information
- Government policies
- Political setup
- Economic trends
- Technological facts
- Factors fo production

Competitive information
- Industry demand
- Demand of products of the company
- Competitive data

Internal information

Production System

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Role

Production planning

Production contorl
- Time standards
- Cost standards
- Quality standards

Product scheduling

MRP

Chapter - 5
DSS & EIS

Decision support system

- Definition — system - use by mng - to solve semi / un structured
- Nature — tool - don't make dec - provide capability & information
- Used by
  - Directly — himself - QAI
  - Indirectly — staff - QAI

Phases of Decision making in DSS

- Intelligent phase — access to DB - extract inf
- Design phase — Model it - do what if analysis
- Choice phase — Extract alt - rant it - choose best alt

Difference b/w DSS & PDS

DSS goals & Applications / DSS characteristics

- Support semi / unstructured decisions — exp about struct prob - un/semi struct
  - Steps in solving problem
    - Formulate it — define & formulate
    - Model it — with DSS software
    - Run it — what if analysis
    - Obtain results — review - refine - reformulate - use it
- Ability to adopt the changing needs — produce diff type of reports
- Easy to learn and use — understand - GUI - help msg - OLRT - motivate to find solutions

Components of DSS

- User — any level of mnt -with problem
- Database — routine / non routinge- internal / external
- Planning languages — interface with model base
  - General — routine tasks -
  - Special — non routine tasks
- Model base — brain - data manipulation & computation

Software tools of DSS

- Database languages — query - report gntn
- Model based software — spread sheet : disgn - modify - what if analysis
- Statistical software — SAS - stat analysis - mkt analysis -
- Display based software — graphic output - pie - line - bar

Areas for applying DSS

- Costing / Pricing — cost + profit margin
- Capital budgeting — feasibility - alt invst
- Budget — functional - fixed

Executive Information System

- Meaning — DSS - meet spl needs - of top level
- Meaning of executive — mngr - top level - resp for success of org

Kinds of Executive Decision making

- Strategic planning — supra
- Tactical planning — supra
- Fire fighting — major problem - suit - strike - recession
- Control — control over org - compare perf data with planned data

Main source of information

- Environmental information
  - Government policies
  - Political setup
  - Economic trends — GDP - per capita - disp income - emp level
  - Technological facts
  - Factors fo production — RM - labour - land - capital - domestic condition
- Competitive information
  - Industry demand — product - area : by industry
  - Demand of products of the company — demand - capacity of co. product
  - Competitive data — plans - decisions
- Internal information — to exercise control over functional area -

5 Characteristics of Executive Decision making

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- Lack of structure
- High degree of uncertainity
- Future orientation
- Informal source of information
- Low level of detail

Purpose of EIS

DOOM

- Decision making
- Oppurtunity — various inf - various formats - short time - accuracy - reliablity
- Objectives — all mngr - work integratedly
- Measuring — whats get measure , gets done

Chapter - 6
Enabling Technologies

Introduction About terminals

- Dumb terminal — DC - DD
- Intelligent Terminal — DC - DD - DS - DP

Traditional Models

- Centralised architecture
- Decentralised Architecture
- Distributed / Network architecture
- File server Architecture

What is client server

- Definition — providing inform - req by user - easily accesible - despite location of data

What is Client server model / Architecture

- Client server technology — divide work - global - local - send record - network traffic - other advantages

Characteristics of Client Server

Apporach required to migrate to client server

- Client — sys - that req - use - data - services - access provided by server
- Server — sys - that prov - data - services - access to clients - multiple clients
- Client - server process — explain - global - local

Application can be divided as following

- Interface
- Presentation
- Application

Components of client server

- Client — PC with LAN - CUI - GUI - OOUI
  - FAT client / FAT server — 2 tier - 3 tier
- Server — meaning - classification : File - DB - Web - Mail
- Middleware — Middle ware connects client and server through - Distributed software

Middleware is typically composed of 4 layers

- Service layer — Data sent & received
- Process layer — network routing - mesh topology
- Transport layer — packets
- Network operating system layer — add information

- Network — type of link b/w client and server

Risk in migrating from Mainframe to client server

TOPE

- Technological risks — work - expectation - survive obsolscence
- Operational reisks — eliminate mainframe - avoid duplication
- Economic risks — hidden costs
- Political risks — people risk

ELIMINATION OF RISKS — eliminate MF - CS security - training - access anywhere any time

Client server security

Control techniques : Essential for current server technology

- Disabling the floppy direce
- Diskless workstation
- Provide the security to data
- Network monitoring
- Data encryption technique
- Application controls may be used
- Information provided according to user requirement

Chapter - 7
System Development Process

System Development process

- Meaning — process - exam present bus situation - to improve it - with better procedures and methods
- Classification
  - System analysis — problems - solutions
  - System design — new system with - solutions - and satisfy new requirements

System development life cycle — SDLC

- Preliminary investigation — submit request for new system
  - Request clarification — what they actually need
  - Feasibiltiy study — feasibility study - T - O - E
  - Request approval — based on the above information
- Requirement / System analysis — interact & watch - fact finding tech - int - quest - observation
- System design — incorp - req & sol for drawback - procedures in detail
- Acquisition and development of software — hardware - software - buy - lease - in house soft depend on
- System testing — reason - test data - actual data
- Implementation and maintainence — train & implement - review - maintainance

Reasons for Failure to achieve System development objective — LaLa NUTTO

- Lack of support
- Lack of involvement
- Needs
- Unstructured
- Technology
- Time / Budget
- Others — lack skills - people risk - testing time not sufficient

Approaches of System Development — (Adv & Disadv)

- Traditional approach — waterfall approach - stage wise completion - mngt sign off
- Prototype approach
  - Identification of user requirements
  - Develop initial prototype
  - Test and revise
  - Obtain user signoff of approved prototype
- End user development approach — standardisation - integration - quality - security - non upgradeable
- Top down approach — goal & obj - function area - activities & decisions - models - for Dmaking
- Bottom up approach — life streams - inf sys dev - integrate - model - for Dmaking
- Systematic approach — locate - evaluate - secure

(for development in small organisation)

System development methodology / System development life cycle methodology

- Division
- Deliverables
- Review
- Testing
- Training plan
- Implementation

Preliminary investigation

- What investigation is done in preliminary stage
  - Reviewing internal documents
  - conducting interviews

- Feasibility study
  - Meaning
  - Technical feasibility
  - Economic feasibiltiy
  - Operational feasibility
  - Schedule feaasibility
  - Legal feasibility

- Cost and benefit of proposed system
  - Cost can be divided into
    - Development costs
    - Operational costs
    - Intangible costs
  - Benefits can be divided into
    - Tangible benefits
    - Intangible benefits

Chapter - 9

System Acquisition , Software development & testing

Factores to be considered while selecting Computer system / Hardware — LaP SoCoCo

- Latest technology — better perf - low cost
- Performance — speed & capab - Input / output / storage pheripherals
- Software supplied by manufacturer — general purpose - special purpose
- Compatiable machine
- Computer selection — manftr - model - configuration

Software acquistion

- Created in house
- Acquired from vedor

Adavantages of Pre written application package — RaQ CoLo

- Rapid implementation
- Low risk
- Quality
- Cost

Sources of Packaged software

- Sources
  - Computer manufacturers
  - Large software houses
  - Small software houses
  - Computer retails tores
  - User groups
- Disadvantage — diff to install - undetected bugs - adequately dev & tested
- Solution — satisfy the above requirements

Steps involved in selection of computer system (Hardware and software)

- Prepare design specifications — eliminaation 1
- Prepare and distribute RFP, to selected computer vendors
- Evaluation — elimination 2
- Presentation
- Further analysis
- Contact present users
- Conduct equipment benchmark tests
- Selection of computer system

Validation of Vendors proposals - Factors to be considered

Validation means — process of - evaluation - ranking of vendor proposals

- Performance capablity of each proposed system — Bench mark test
- Cost and benefit of each proposed system — for each proposals
- Maintainability of each proposed system — flexibility
- Compatiability of each proposed system with existing system
  - Hardware compaitabiltiy — upgradation of LAN
  - Operating system compatiabiliy — Stand alone OS to network OS
- Vendor support

Methods of validating proposal

- Checklist — **criteria - resposne by vendor**
- Point scoring analysis — **criteria - awarding of points**
- Public evaluation reports — **consultancy agencies - compare and contrast**

Assuming one / more systems are deemed satisfactory - 2 questions remain

- Are present users of the system - satisfied
- Will the system actually perform
  - Desk checking
  - Benchmark test

Benchmarking problem for vendor proposal

- Meaning
- Advantages
- Disadvantages

Test problems

- Meaning

Software development involves the following 6 stages

- Program analysis — **input - output - processing req**
- Program design — **Flow chart - structured chart - pseudo code - projection of logic**
- Program coding — **more than one lang - objectives - compiler**
- Debug the program
  - steps of debugging — **batch - interactive compiler**
  - Use structured walk through — **to correct the logical error**
  - Test the program — **batch testing - interactive testing - Log of test results**
- Program documentation — **review it - understandability**
- Program maintainence — **to meet the future requirements**

Program design tools NOV -09

- Program flow chart
- Pseudo code
- Structure chart
- 4GL tools
- Object oriented programming and design tools

Testing of system developed

- Steps involved are — **Prepare test data - process it - check results**
- Paralle run — **testing parrallely - comparing it**

Chapter - 10

System Implemenation and maintainence

Introduction

- Implementation — convert system from old to new
- New system means — new - replace manual - replace automatic - major modification
- Successful implementation — may not g'tee improvement
- Improper implementation — will prevent improvement

4 Aspects of implementation

- Equipment installation
- Training personnel
- Conversion procedures
- Post implementation evaluation

Equipment installation

- Site preparation — vendor req - no stingy - reduce prod - vendor problem - carpets - space planning
- Equipment installation — install - power - communication lines
- Equipment checkout

Training personnel

Inf system - succed / fail - operation & use - training

- Training systems operators — responsible - routine /non - routine - fund training - common malf - TS list
- User training — operation - TS list - data handling - system maintainence

Conversion / change over from manual to computersied system (Adv & disadv)

- Conversion strategies
- Direct changeover
- Parralel conversion
- Gradual conversion
- Modular prototype conversion
- Distributed conversion

Activities involved in conversion

- Meaning
  - Procedure conversion — Optng procd document - oral support - answer quest -
  - File conversion
  - System conversion
  - Alternative plans in case of system failure

Evaluation of new system

- Basis dimensions of evaluation — optng properly - satisfication
- Uses of feed back — adj to new system - adj to future system development

Methods of Evaluation

- Development evaluation — sch / budget - actual - compare with planned data
- Operational evaluation — process in time - comp accurately - easy to work - response time - processed in time - storage
- Information evaluation — objective - evaluaiton not practically possible - indirectly - interv - question

Chapter - 12

Enterprise Resource Planning

Meaning of ERP

- Meaning — fully intgtd BMS - cover func areas - organises & integrate : operation process & infmn flow - to optimise resorc
- Enabling Technologies for ERP — 3 tier architecture

Characteristics & Features of an ERP — FMCBB

- Flexibility
- Modular and open
- Comprehensive
- Beyond the company
- Best business practices

What facilities does ERP provide to businesses / Benefits

(read from book)

Business process re-engineering

- Mandatory
- Meaning
  - Fundamental rethinking
  - Radical redesign
  - Dramatic improvements

Business engineering

- Merge of two concepts
  - Information technology
  - Business process reengineering

aims to redisgn the organisations value added chains, which are series of bus steps, when completed

add value to organisation and customers

Business Management

Steps in ERP implementation

- Development of business process model
- Consists of 2 elements
  - A diagram — bus activites & their interconnections
  - Underlying data model — Listing their process & related data entities

Steps in ERP implementation / Guidelines

- Identifuing needs for implementing ERP package
- Evaluation of the present / Existing business condition
- Deciding on the desired / expected condition
- Re-engineering business processes
- Evaluation of the various ERP packages
- Deciding on a suitable ERP
- Installing the required hardware and networkds for the selected ERP
- Deciding on the implementation consultants who would assist in the implementation
- Implementing ERP

Post implementation Scenario

After implementation, organisation has to brace upto consequential changes

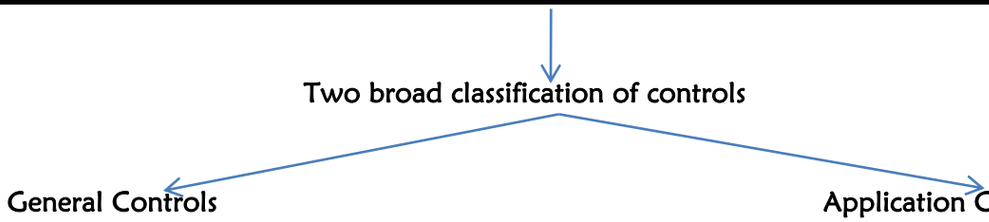
- Strategic level change
- organisation level change
- Bus process change
- Change in Thought process among employees
- KPI to be identified & Measured

Post implementation problems

- Monitor KPI
- Improve them
- Data mig problem - use old system
- Difficult to wean away users from the old system
- Top mngt should show commitment to implementation system

Chapter - 13

Chp - 13 : General EDP Controls



Discussed in this chapter

Discussed in Chapter - 14

Divided into the following Controls

- Operating system controls
- Data management controls
- Organisational structure controls
- Systems development controls
- Systems maintainence controls
- Computer centre security controls
- Internet and intranet controls
- Personal computer controls

Requirement of Controls

EDP systems process more data than manual systems - Chances of errors also more
Computer store and process data in a form- not readable by human systems
Audit trials are diminshing which leads to difficulty in tracing transactions

Why should auditors have a clear understanding of these controls

To audit through computer
To test controls to see if they are working correctly

OPERATION SYSTEM CONTROLS

Meaning of operating system — **computers control program - used by comp app to share comp resources**
Importance of operating system security — **this compromised - then app level security also may be compromised**
Tasks performed by OS — **high to mach level lang - allocate comp resources - multiprogramming**
10-May Five control objectives of OS

OS to protect itself from users	**app should not control the o/s**
OS to protect users from one and others	**one app should not destroy others data**
OS to protect users from themselves	**one app may have more than one module**
OS to protect from itself	**o/s also made of more than one module**
Protecting OS from its environment	**power / other disaster - os able to achive control closure**

Meaning of OS security

Who can access OS	
Which resources they can access	**files, programs , printers**
What action they can take	**read, write, modify, delete**

Security components of OS

- Log on procedures — **user id & Pd, - compare with access list - correct / incorrect**
- Access tokens — **if logon successful - create access token - ID PD privilages**
- Access control list — **access to resource - compate AT & ACL - correct / incorrect**
- Discretionary access control

Password as a method of access control

- Meaning — **secret code - to gain access - entered by user**
- Types of password — **reusable / one time password**
- Characteristics of a good password

min length - alpha num - no dic word - no per inf - frequent change - donot repeat PD

Control against virus and other destructive programs

- Virus
- Worms
- Logic bombs
- Back doors
- Trojan

INTERNET & INTRANET CONTROLS 10-May

COMMUNICATION SUB SYSTEMS

- Meaning — **responsible for receiving - transmitting data**
- Two major exposures
  - Component failure
  - Subresive threats

Component failure

refers to - communcation lines - hardware - software

Subresive threats

- Invasive tap
- Inductive trap

Methods to control from subresive threats

- Firewalls
  - Network level firewalls
  - Application level firewalls
- Controlling a DOS Attack
- Encryption
- Message transaction log
- Call back devices

PERSONAL COMPUTER CONTROLS

Weak access controls
Multilevel password contols
Inadequate back-up procedures

Organisational Structure controls

Meaning segregation of duties in computerised environment - manual - computer enironment

Segregation of duties

System Dev / maint VS Operational people

not be combined for following reasons - increase fraud - unauthorised changes - can remove such changes

DBA Vs Other functions

DBA : db scty - create access lists - monitoring usage - if delegated to end user - threat to DB integrity

System Dev Vs System Maint

2 types of control problems - Inadq docmntn (not intersting - retain power pstn) - program fraud

Solved by division into - Dev group - Maint group

Data Librarian Vs Operations people

Data lib : storge of offline files - Data lib : control access, resp for receipt storage retrival customdy - keep log

Computer Centre security and control

Meaning steps - to reduce the risk caused by - natural factors - manmade factors

Protection against fire

Fire prevention : fire rstnt mat - structure should be stable - mat sucptible to fire not used

Fire detection : auto/manual fire alarm - signal to permnt maned sec statn - smoke detectors

Fire supression : water based - halon gas - carbon di oxide

Protection against water damage

Caused by : water sprinkles - leak from water pipes - floods - cyclones

Protection : water proof ceilng - drng sys good - comp fac @ high lvl - dry pipe sys - hardwa covd

Protection against energy variations

caused by : increase - decrease - loss of power

Protection : voltage reg - circuit breakers - batter - power generators

Protection against pollution damage

caused by : dust - damage to read/write head- recording surface may be damaged

Protection : reg clean - dust collec rugs - cleain floors - prohibit food - empty waste baskets

Protecting against unauthorised intrusion

DRP : Disaster recovery plan

Meaning Contingency measures that the organisation should adopt to recover from / prevent any disaster

Components

- Emergency plan — post disas actvty - notify personel - guidelines - evacuation procedures
- Recovery plan — invty of H S Doc - rnkg app on criticallity - selection of dis rec site
- Back up plan — bck up of H & S - Soft keep at distant phy locaation
- Test plan — to find the weakness, types : paper walk through - logicalised test - full test

Chapter - 14

Application level controls in an EDP Environment

Input Controls

- Meaning — **Ensure - Data brought into system for processing are**
  - Valid
  - Accurate
  - complete
- Types of input and error correction
  - Real time input — **less human intevention - so less error - but realtime error - need RT editing tech**
  - Batch mode of data entry — **more human intvn - so more prone to error - detect error**

Type of Input controls

- Source document controls — **People may misuse it to do fraud**
  - Pre-numbered source document
  - Use of source document in sequence
  - Audit of source documents
- Data coding controls — **That checks the integrity of codes**
  - Addition errors
  - Truncation error
  - Substitution erros
  - Single transposition error
  - Multiple transposition error
  - (solution)
  - Check digit — **control digit , added to code @ time of assigning codes**
- Batch controls
  - Meaning — **Effective method to manage high volume of data**
  - Objective — **All records - no records - audit trials**
  - Methods to achieve the above objective
    - Batch transmittal sheet (contents)
      - Unique batch number
      - Date
      - Code identifying the transactions
      - Record count - No. Of records — **record count**
      - Batch total — **Financial field**
      - Hash total — **Non Financial field**
    - Batch control log
      - **data control clerk - data entry dept**
    - Hash total , how does it work
      - **example of bank cheques**
- Validation controls
  - Meaning — **Intended to check errors in transaction data before the data is processed**
  - 3 levels of input validation controls
    - Field interrogation — **checks the validity of the data in the field**
    - Record interrogation — **Integrity of records in file**
    - File interrogation — **correct file is being processd by the system**

Various types of field interrogation — LPVCAC

- Limit check — values lie within certain predefined limits
- Picture check — check against processing - of incorrect characters
- Valid code check — input code compared with the pre determined values
- Check digit — control digit , added to code @ time of assigning codes
- Arithmetic check — done in an distinct way - to validate the values of selected fields
- Cross check — verifying fields appearing in various files

Various types of Record interrogation

- Sequence check — To check missing transactions
- Format completeness check — to check the presence and position of all fields in a transaction
- Redundant data checks
- Combination check — compares 2 records for validity
- Passwords — controlling access to various fields
- Which of the above checks to be implemented — depend on the cost / benefit - - Error in Transaction / Maste file
- Methods of dealing with erroneous data

Various tupes of File interrogation

- Label check — to ensure that file processed is correct file
  - Internal labelling
  - External labelling
- Version check
- Expiration date check

Methods of Input error correction

- Immediate correction — Direct validation method
- Creation of error file — Delayed validation method
- Rejecting the batch — When the error cannot be related to a single record

Processing Controls and its various Classification

- Run to run controls — to ensure that correct & Complete processing
  - Meaning — use control totals to monitor a batch when in moves from one run to another
  - Types of RTR controls
    - compare with control records:
      - Re-calculate control totals — after each run - controls computed - compared
      - Transaction codes — comp of tr code with - control records
      - Sequence checks — compares seq of each rcd with that of prv recd - to ensure sorting
- Operator intervention controls — System require intervention of operator - calculate controls - parameter values
  - Human intervention increased, then more prone to errors
  - operator intervention cannot be eliminated
  - but it can be reduced , by providing more logic in program
- Audit trial contorls — (manual system - can be traced - comp system - audit trial fragmented)
  - Transaction logs — Total record = Transaction log + Records in error file
  - Trnasaction listing — hard copy of tr log - given to user - reconcile with the inputs
  - Log of automatic transactions — no human intervention - Tr log to control it
  - Listing of automatic transactions — reconciliation
  - Unique transaction identifiers — to enable to trace - in million of records
  - Error listing — given to users - to help to error correction and resubmission

Output controls

Meaning — **Ensure -that system output are not**
- Lost
- destroyed
- corrupted

Types of control - depend upon the type of processing used
- Real time
- Batch mode

Classification of batch output controls

- Tape & Disk output control — **not visible to human eye - hence need control**
  Echo check - writing on disk - correct / incorrect
- Output control over printed output
  - Verification of output — **directly - indirectly - exceptional reports**
  - Distribution of output — **user dept same - not same**
  - Procedure for acting on exceptions
    user dept same - not same

Chapter - 15

Detection of Computer frauds

Meaning of the term, Computer frauds, It inlcuds

- Clearly recognizable frauds
- Hacking
- Manipulation of computer systems to obtain money
- Theft / Destruction of confidential and sensitive information
- Computer abusive by employees
- Software piracy

Reasons why businesses should take computer frauds seriously

- Increase dependency on the computers
- Payment using technology
- More systems are on the internet

How computer frauds different from other conventional frauds

- Easily committed
- Easily hidden and hard to find
- Evidence hard to find
- Evidence difficult to prove

Primary risks to business

- Internal threats — **by companys own staff**
- External threats — **outsiders probably in collusion with co. staff**

Internal threats

- Meaning — **Danger than external threats**
- Input — **Simplest way to commit fraud - no need of computer kwnoldge - but should know how system works**
  - Collusive fraud — **Replace pay in slip**
  - Cash receipt frauds — **not accounting**
  - Disbursement frauds — **excess payment - payment for no order received**
  - Payroll fraud — **dummy employee - removed empyee retained**
- Processing — **theft of comp time - services - keep personal files - own business - unauth website access**
- Computer instructions — **knowloedge about computer - required**
  - Tampering
  - copying
  - developing
- Data
- Output
- Malicious alteration fo EMAils

External Threats

- Risks due to hacking

Internet frauds

NOV -09

- Meaning
- Characteristics
  - Unregulated
  - Global reach
  - Cannot distinguish genuine from false sites
  - Legal issues

Computer fraud and abusive techniques

- Hacking
- Cracking
- Trojan
- Rounding down
- Salami technique
- Visuses
- Worms
- Logic bombs
- Trap doors
- Denial of service attack - DOS
- Piggy backing
- Wire trapping
- Masquerading / impersonation
- Social engineering

Why do frauds go undetected / Why can we not realistically estimate the loss due to frauds

- What constiture fraud - unclear
- Undetected
- Uncovered frauds - donot get reported
- Low level of network security
- Free availability of information
- Weak law enforcement machinery

How to reduce potential for fraud

- Make frauds less likely to occor
- Use of good hiring and firing practices
- Managing disgrunted employee

Employee training / Areas in which employees need to be trained

- Security measures
- Telephone disclosure
- Fraud awareness
- Ethical considerations
- Punishment for unethical behaviour
- Managing and tracking software license
- Confidentiality agreements

How to increase the difficulty of committing fraud

- Developing strong system of internal controls
- Segregation of duties
- Policy of compulsory vacations and job rotation
- Access restriction to computer equipment and data files
- Data and program encryption
- Protection of telephone lines
- Protection of system against viruses
- Control laptop computers
- Control over sensitive data

Steps to improve fraud detection methods

- Conducting frequent audits
- Computer security officer - CSO
- Computer consultants
- Monitoring system activities
- Use of fraud detection software

Methods to reduce fraud losses

- Meaning
    - Insurance
    - Back ups of data and programs
    - Develop contingency plans for fraud occurances
    - Special software

Why do frauds go un - reported / un - prosecuted

- Undetected
- Reluctance on part of companies in reporting frauds
- Difficult, costly and time consuming
- judiciary overloaded with handling violent crimes
- Judiciary lacks necessary computer skills
- Sentences given are very light - on conviction

Chapter - 16

Information Technology Act, 2008

Objectives of the act
Scope of the act
Asymmetric crypto system
Key pair
Certifying authority
Digital signature
Secure system
Verify as regards to DS
Authentication of Electronic records using DS
Legal recongition to DS
Legal recognition to ER
Provisions regarding acceptance of electronic records and DS by Government
Retention of ER
Power of CG to make rules as regards to DS
ER attributable to the sender
Acknowledgements of ER
Factors to be considered - Security procedure
Secure ER & Secure DS
Controller of CA
Funcitons of the controller of CA
Controller to act as repository
Situations - Controller may suspend license granted to the CA
Procedures to be followed by CA
Basic conditions satisfied before a CA, can issue a DS certification
Situations - CA can suspend a DS certificate
Situations - CA may revoke a DSC
Diuties of Subscriber
Penalties for damages to computer , computer system and network
Powers of Cyber Appellate Tribunal
Compounding of offences
Various offences and related penalties

Chapter - 17

INFORMATION SYSTEM AUDIT

Scope & Objective of - ISA

Computer system & Applications	meet user needs - produce relaiable & Timely reports
Information processing facility	Process is : accurate - correct - efficient, - process under nml / disrptv condition
System development	Written - tested - installed in line with industry best practices
Management of information systems	
C/s , Intranets, Internets	

Objectives - IS auditor should ascertain that the following objectives are met

Overall security	sec provided to - comp - data - programs - access
Program Development	performed with authorisation of management
Program modifications	are authorised by management
Transaction processing	accurate - complete - reliable - efficient
Source data	inaccurate & incomplete are identified - corrected
Data files	accurate - complete- cofidential

Audit framework - For each area

Identify - types of error / Fraud / Control weakness
For each E/F/CW - identify the control procedures
Identify - Audit procedures - to ensure that these controls are in place & Working
Primary contorls absent - Compensating controls

Concurrent audit techniques

ITF
Snapshot technique
SCARF
Audit hooks
CIS

Chapter - 18

Information Security

Importance of Information Security

Need

Responsibility

Impact of security failure

- Financial lossess / Tangible lossess
- Intangible lossess

Nature of threats

- Intentional
- Unintentional
- Internal
- External

Type of Threats

- Technical conditions
- Natural disasters
- Environmental conditions
- Human factores
- Unauthorised access
- Dependency on third party, communication lines, outsourced operations

Uses of Information security

- Smooth function
- Protection

Meaning of Information Security

Security means

Types of security

- Physical safeguards
- Logical / Technical safeguards

Security objective

How is SO achieved

- Confidentiality
- Integrity
- Availability

Sensitive Informatioin

- Strategic plans
- Business operations
- Finances

Factors to be considered for better information protection

- Not all data have same value
- Know where critical data resides
- Develop an access control methodology
- Protect information on stored media
- Review hard copy outputs

Eight core principles of Information security

- Accountability
- Awareness
- Multi disciplinary
- Cost effectiveness
- Integration
- Re-assessment
- Timeliness
- Social factors

Methods to protect computer held information

Basic rules
- Location
- Value of information
- Access rights
- Turn around time

2 Basic types of protection an organisation can use
- Preventive information protection
- Restorative information protection

Preventive information protection
- Physical
- Logical / technical
- Administrative

Restorative information protection
- Meaning
- Some questions to be asked

Approach to implement information security

Responsibility (CEO)
- Development
- Implementation
- monitoring, of Security controls

Areas to be covered / addressed for implementation of information security
- Drafting of security policy
- Defining roles and responsibilities
- Design of a security and control framework
- Implementation of the controls / security measures
- Monitoring of the controls / systems
- Creating awareness & Training

Chapter - 19
Case Tools

Case tools

- Meaning — CASE - SE, creation & building of software - CT help in automating manual activities

Components of Integrated Environment

MADS

- Analysis Dimension — planning - defining requirements - designing systems
- Development dimension — contains prog dev tools like editors, compilers, debuggers
- Management dimension — tools to manage and control the projects
- Support Dimension — tools to sustain & maintain software systems

Classification of the Case tools

- Case tools — support ind process tasks
- Case work benches — contains integrated tools - support process phases
- Case Environments — contains integrated WB - supports all / part software process

Case tools

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- Meaning
- Integrated Case tools
  - Platform Integration
  - Data integration
  - Presentation Integration
  - Control Integration
  - Process Integration

Case Workbenches

- Meaning — contains integrated tools - support process phases
- Types of case work benches
  - Software development work bench
  - Cross development work bench
  - Configuration management work bench
  - Documentation work bench
  - Project management work bench

Software development / Programming work bench

LSLL-CSDI

- Meaning — set of tools - to support the program development process
- Some of the tools are
  - Lanuage compiler — convert host to object code - create AST
  - Structured editor — Edit the syntax representation in the AST, rather in Source code
  - Linkers — links the object code with the components - already compiled
  - Loader — loads the exe program - prior to execution
  - Cross reference — listing of where all the prog names are declared
  - Static analyser — analyses source code errors , anomalies, mistakes
  - Dynamic analyzer — irt source code - analyses how many times each stmt was executed
  - Interactive debugger — to control the sequence execution

4GL Work bench

DFSR

Meaning — Interactive app - extract inf from DB - present to End user - update the DB, with the changes made by EU

Some of the tools are

Database query language	like SQL - to extract data from the DB
Form design tool	create forms for data input & data display
Spread sheet	used for analysis & manipulation of numerical information
Report generator	define and create reports from inform in the DB

Analysis & Design Work benches

DDRI - DFCR

Meaning — Support the A & D stage of software dev process

Some of the toos are

Diagram editor	create DFD - Structured charts
Design analysis & Checking tools	checking and analysis
Repository query language	find the infm in the repository - irt design
Import - export facilities	interchanging of inf b/w - rep to dev tools
Data dictionary	data about data
Forms defintion tools	create forms for data input & data display
Code generators	generate code / code skeletons
Report definition & Generation tool	define and create reports from inform in the DB

Testing work benches

TTO - DFSR

Meaning — those integrated tools which help in testing

Some of the tools are

Test manager	manages running & rptng of test - keep tract on test data, test results
Test data generator	generates test data
Oracle	prediction of expected results
Dynamic analysers	irt source code - analyses how many times each stmt was executed
File compactor	compares the results
Simulators	
Report generator	reports the generated results

Meta case workbenches

Similar to A & D WB

Meaning

Some of the tools are

- Diagram editing system
- Design analysis and checking facility
- Query language facility
- Data dictionary
- Report generator
- Forms generator
- Data import / export
- Code generators

CASE Environment

Refers to

- Carefully configured and integrated system of automated tools
- Applied to entire SDLC
- For each development , maintainance and redevelopment problem