

PAPER – 6 : MANAGEMENT INFORMATION AND CONTROL SYSTEMS

Question no. 1 is compulsory.

Answer any four questions from the remaining six questions.

Question 1

- (a) *A XYZ Company receives orders from customers either by telephone, facsimile or electronic data interchange. A clerk then transcribes the order into one of the company's order form to be keyed into the order entry system.*

You being the information system auditor of the company, suggest various internal control procedures to be adopted to prevent inaccurate or unauthorized source data entry?

- (b) *Describe the composition and powers of Cyber regulatory appellate tribunal.*
- (c) *Discuss the limitations of the Management Information system.*
- (d) *Define the following computer Fraud and Abuse technique:*
- (i) *Hacking*
 - (ii) *Logic time bomb*
 - (iii) *Piggy backing*
 - (iv) *Spamming*
 - (v) *Data diddling.*

(5 + 5 + 5 + 5 = 20 Marks)

Answer

- (a) The auditor should ensure that the source data controls such as proper authorization and editing data input are integrated with the processing controls and are independent of other functions. If source data controls are inadequate, user department control over data preparation, batch control totals, and edit programs etc. should be stronger.

The following control procedures may be adopted:

- Effective handling of source data input by data control personnel.
- User authorization of source data input.
- Preparation and reconciliation of batch control totals.
- Logging of the receipt, movement and disposition of source data input.
- Check digit verification.
- Key verification.
- Use of turnaround documents.
- Computer data editing routines.
- File change listings and summaries prepared for user department review.

Although source data controls may not change often, the auditor should test them on regular basis by evaluating samples of source data.

- (b) **Cyber Regulatory Appellate Tribunal** : The cyber regulation appellate tribunal shall consist of one person only called the Presiding Officer of the Tribunal who shall be appointed by the Central Government. The person must be qualified to be a Judge of a High Court or is or has been a member of Indian Legal Services in the post in Grade I of that service for at least three years. The Presiding Officer shall hold the office for a term of five years or upto a maximum age limit of 65 years, whichever is earlier.

Some of the powers specified are following:

- (i) Summoning and enforcing the attendance of any person and examining him on oath.
 - (ii) Requiring production of documents and other electronic records.
 - (iii) Receiving evidence on affidavits
 - (iv) Reviewing its decisions.
 - (v) Issuing commissions for examination of witness etc.
- (c) **Limitations of the Management Information System** :
- (i) MIS is not a substitute for effective management. It cannot replace managerial judgement in making decisions in different functional areas.
 - (ii) MIS may not have requisite flexibility to quickly update itself with changing needs of time.
 - (iii) MIS cannot provide tailor-made information packages suitable for the purpose of every type of decision made by executives.
 - (iv) MIS takes into account mainly quantitative factors, thus it ignores the non-quantitative factors like morale and attitude of members of the organization.
 - (v) MIS is less useful for making non-programmed decisions.
 - (vi) The effectiveness of MIS decreases due to frequent changes in top managements, organisational structure and operational team.
 - (vii) MIS effectiveness is reduced where culture of hoarding information and not sharing with others exists.
 - (viii) The quality of the outputs of MIS is basically governed by the quality of input and processes.
- (d) (i) **Hacking**: It refers to unauthorised access to and use of computer system usually by means of a personal computer and telecommunication network.
- (ii) **Logic time Bomb**: It refers to the program that lies idle until some specified circumstance or a particular time triggers it. Once triggered, the bomb sabotages the system by destroying programs, data or both.
- (iii) **Piggy Backing**: It refers to tapping into a telecommunications line and latching on

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to a legitimate user before he logs into the system; legitimate user unknowingly carries perpetrator into the system.

- (iv) Spamming: It refers to a situation where the same message is e-mailed to everyone on one or more Usenet news groups or LISTSERV lists.
- (v) Data diddling: Changing data before, during or after it is entered into the system in order to delete alter or add key system data is known as data diddling.

Question 2

- (a) *What do you mean by Information? Describe the important characteristics of information, which makes it useful to the organization.*
- (b) *"Information is necessary to executive for performing the function of planning". Substantiate the above statement with regard to information requirements of a marketing system.*
- (c) *Describe various decisions which can be made with the help of Financial Information system.* (10 + 5 + 5 = 20 Marks)

Answer

- (a) Information: Information is data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in current or progressive decision. The term data and information are often used interchangeably. However, the relation of data to information is that of raw material to finished product.

Characteristics of Information: The important characteristics of useful and effective information are as follows:

- (i) Timeliness: Timeliness refers to when user needs information. Some information is required on regular, periodic basis – perhaps daily, weekly, monthly or quarterly, while much other information is generated on the request of the manager. Usually as we proceeds from lower level to higher level of management, the time interval necessary for providing decisions impelling information on a routine or on exception basis increases at strategic level.
- (ii) Purpose: Information must have purposes at the time it is transmitted to a person or machine, otherwise it is simple data. Information communicated to people has a variety of purposes because of the variety of activities performed by them in business organisations. The basic purpose of information is to inform, evaluate, persuade and organize. It helps in creating new concepts, identifying problems, solving problems, decision making, planning and controlling.
- (iii) Mode and Format: The mode of communicating information in business are either visual, verbal or in written form. Format of information should be so designed that it assists in decision-making, solving problems, planning, controlling and searching. Therefore, all the statistical rules of compiling statistical tables and presenting information by means of diagram, graph, curves etc. should be considered. The reports should be preferably supplied on an exception basis to save the manager

from an overload of information. Also the data should be classified into categories, which have relevance to the problem at hand.

- (iv) Redundancy: It means the excess of information carried per unit of data. However, in business situation redundancy may some time be necessary to safeguard against error in the communication process.
 - (v) 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 numeric characters transmitted per minute. For machines, the rate may be based on the number of bits of information per character per unit of time.
 - (vi) Frequency: The frequency with which information is transmitted or received affects its value. Frequency has some relationship with the level of management and it should also be related to operational needs. For example, at the level of foreman it should be on weekly basis but at the management level, it should be usually on monthly basis.
 - (vii) Completeness: The information should be as complete as possible. For example, net present value models provide a point estimate and do not give any indication of the range within which these estimates may vary. Thus, complete information helps the manager to arrive at better decisions.
 - (viii) Reliability: In statistical surveys, for example, the information that is arrived at should have an indication of the confidence level. Even otherwise also, information should be reliable.
 - (ix) Cost benefit analysis: The benefits that are derived from the information must justify the cost incurred in procuring information. The information may be categorised into three categories: (i) necessary (ii) normal and (iii) extra. The information of necessary category cannot be discontinued whatever be the cost of preparing them. The second category statements may have a high cost but may be discontinued only in very stringent circumstances. Some of the normal statements can be discontinued or replaced if their costs are too high.
 - (x) Validity: It measures the closeness of the information to the purpose, which it purports to serve. The measures suiting the organisation may have to be carefully selected or evolved.
 - (xi) Quality: It refers to the correctness of information, which is likely to be spoiled by personal bias. Hence, proper internal controls and procedures should be developed.
- (b) Information requirements of a Marketing System

The information required for the purpose of planning in the case of a marketing system can be classified into three types:

- (i) Environmental Information: It includes the following:

- (a) Political and Governmental considerations: To forecast market plan, political stability etc., information plays an important role as it enables executives to guess quite accurately the financial policies, taxation and their effect on the organization.
 - (b) Demographic and social trends: Information about demography, its compositions and location is also useful to business organisation for planning its products, services or outputs.
 - (c) Economic trends: This includes information related to the GNP level and trend, disposable income of consumers, employment, productivity, capital investments, prices, wage level and numerous other economic indicators which provide valuable planning information for those firms whose output is function of these variables.
- (ii) Competitive information: Data related to business operations of competing firms is quite useful for forecasting individual firm's product demand, making decisions and plans to achieve the forecast.
- (iii) Internal information: Information available from internal sources affects the planning decisions at different levels in the organizations. The main sources of internal information are: (a) Sale forecast, (b) Financial plans , (c) Supply factors and (d) Policies .
- (c) Financial decisions: Various financial decisions made with the help of Financial Information System are as follows:
- (i) Estimation of requirement of funds: A careful estimation of funds and the timing when they will be required is to be made. This can be done by forecasting all physical activities of the firm and translating them into monetary units.
 - (ii) Capital structure: Decisions are to be taken to select an optimal mix of different sources of capital structure so that the company is able to procure funds at optimum cost.
 - (iii) Capital Budgeting: Decision makers can determine feasibility of investment in long-term assets. This will help in attainment of financial objectives.
 - (iv) Profit planning: Financial decisions concerning profits and dividend are to be taken to ensure that adequate surplus for future growth is available.
 - (v) Tax management: The purpose of tax planning is to take full advantages of exemptions, deductions, concessions, rebates so that outflow of cash resources by way of tax is minimized.
 - (vi) Working Capital Management: Working capital is concerned with investment of long-term funds into current assets. Decisions are to be taken for effective financing of current assets required for day-to-day running of the organisation.
 - (vii) Current Asset Management : Policy decisions are taken regarding various items of current assets. Credit policy determines the amount of sundry debtors at any point

of time. Inventory policy is to be determined jointly between finance and production department.

Question 3

- (a) *A Company is offering a wide range of products and services to its customers. It relies heavily on its existing information system to provide up to date information. The company wishes to enhance its existing system. You being an information system auditor, suggest how the investigation of the present information system should be conducted so that it can be further improved upon.*
- (b) *Describe various software tools used in Decision support system.*
- (c) *Describe various components of Client server architecture. (10 + 5 + 5 = 20 Marks)*

Answer

- (a) Investigation of present system: It involves collecting, organizing and evaluating facts about the system and the environment in which it operates.

The following areas should be studied in-depth so that the enhanced system can be improved upon :

1. Review of historical aspects: A brief history of the organization is a logical starting point for an analysis of the present system. The historical facts should identify the major turning points and milestones that have influenced its growth. A review of annual reports can provide an excellent historical perspective. A historical review of the organization chart can identify the growth of management level as well as the development of various functional areas.
2. Analyse Input: The auditor should be aware of the various sources from where the data are initially captured, keeping in view the fact that outputs for one area may serve as an input for other area. He must understand the nature of form, what is contained in it, who prepared it, from where the form is initiated, where it is completed etc.
3. Review data files: Auditor should investigate the data files maintained by each department noting their number and size, where they are located, who uses them and the number of times per given time interval these are used. The related cost of retrieving and processing the data is another important factor that should be considered.
4. Review methods, procedures and data communications: Methods and procedures transform input data into useful output. A method is defined as a way of doing; a procedure is a series of logical steps by which job is completed. Its basic objective is to eliminate unnecessary tasks or to perceive improvement opportunities in the present system. Auditor should also investigate existing communication network including components like data interface, data links, modems, dial-up and leased lines and multiplexers to identify the need to revamp the network when new system is installed.

5. **Analyse Output:** The output or reports should be scrutinized carefully to determine how well they would meet the organisation's needs. The auditor must understand what information is needed, and why, who needs it and when. Additional questions concerning the sequence of the data, how often the form reporting it is used, how long it is kept on file etc. must be investigated.
6. **Review Internal Controls:** Locating the internal control points helps the auditor to visualize the essential parts and framework of a system. It also indicates weaknesses of the existing system.
7. **Model the existing system:** As the logic of inputs, methods, procedures, data files, data communications, reports, internal controls and other important items are reviewed and analysed in a top down manner, the process must be properly documented. The logical flow of the present information system may be depicted with the help of system flow charts. The physical flow of the existing system may be shown by employing data flow diagrams. The data flow diagrams are drawn after reviewing or developing system flow charts. Each major operation in the system flow charts is broken down into its lowest-level modules and the data flow diagram is drawn for each one of them. During the process of developing the data flow diagram, work on data dictionary for the new information system should be begun. The data elements needed in the new system will be found in the present system only. Hence, it is wise to start the development of the data dictionary as early as possible.

The flow charting and diagramming of present information not only organizes the facts, but also helps disclose gaps and duplication in the data gathered. It allows a thorough comprehension of the numerous details and related problems in the present operation.

8. **Undertake overall analysis:** Auditor should also undertake overall analysis of the following:
 - (i) Present work volume.
 - (ii) Personnel requirements.
 - (iii) Present benefits and cost.

Each of these must be investigated thoroughly.

- (b) **Software tools of DSS:** Decision support system includes a variety of software supporting database query, modelling, data analysis and display. These tools fall under following four categories:
 - (i) **Database languages:** Tools supporting database query and report generation use mainframe, mini computer and microcomputer based databases. FOCUS, RAMIS and NOMAD II are mainframe based languages supporting data base query, report generation and analysis. FOCUS, RAMIS are also available in PC version. MS Access is one of the most popular database query package used in Window based PC.

- (ii) **Model based Software:** Model based analysis tools such as spreadsheet software enable manager to design models that incorporate business rules and assumptions. Lotusuits and MS-Excel supports model building and "what if" type analysis. Modelling tools like IFPS are designed to support financial modelling and analysis.
- (iii) **Statistics and Data Manipulation tools:** Statistical analysis software such as SAS, SPSSS supports market researchers, operation research analysts and other professionals using statistical analysis functions and are generally used on mainframe computers. Microcomputer-based statistical packages are available as well.
- (iv) **Display based DSS:** Graphic displays of output generated from MS-Excel are very effective in management presentation. Graphics tools running in a mainframe environment include DISSPLA, TELLAGRAF and SASGRAPH. Microcomputer based tools such as Harward Graphics, and Power Point display output in the form of pie charts, bar charts and graphs.

An integrated module of MS-Excel and Power-Point that provides the ability to generate, manipulate and statistically analyse data is best example of query, modelling and display software.

- (c) **Components of Client Server Architecture:** It includes following five components :
 - (i) **Client:** Clients, which are typically PC's, are the user of the services offered by the servers. There are basically three types of clients:
 - (a) *Non-GUI clients:* These require a minimum amount of human interaction. These include ATM, Cell Phones, Fax machine and robots.
 - (b) *GUI Clients :* These are human interaction models usually involving objects/action models like pull down menu in Windows 3-x.
 - (c) *Object oriented GUI:* This client takes GUI-client even further with expanded visual formats, multiple work places and object interaction rather than application interaction. Windows 95 is a common OOGUI-client.
 - (ii) **Server:** Server awaits requests from the client and regulates access to shared resources. There are servers, which fulfil different functions as stated below:
 - (a) *File server* makes it possible to share files across a network by maintaining a shared library of documents, data and images.
 - (b) *Database server* allows processing power to execute SQL requests from clients.
 - (c) *Web server* allows clients and servers to communicate with a universal language called HTTP.
 - (iii) **Middleware:** The network system implemented within the client/server technology is commonly called as middleware. It is all the distributed software needed to allow clients and server to interact. It is typically composed of four layers, which are (i) service, (ii) back end processing, (iii) network operating system and (iv) transport

stacks.

- (iv) Fat client/Fat server: In a Fat client system, more of the processing takes place on the client like with a file server or database server. In Fat server, more emphasis is on the server and it tries to minimize the processing done by the clients. Example of Fat server is web server.
- (v) Network: The network hardware includes cabling, the communication cords and the device that links the server and the clients. The communication and data flow over the network is managed and maintained by network software.

Question 4

- (a) *What do you mean by Production scheduling? Draw the information flow diagram for design of computerized production scheduling system. Also explain:*
 - (i) *System interface*
 - (ii) *File inputs and*
 - (iii) *Reports required for the above system.*
- (b) *Briefly discuss about various factors which should be considered for evaluating the vendor proposal for supply of computer system.*
- (c) *Describe various strategies for change over from manual system to computerised system.* (10 + 5 + 5 = 20 Marks)

Answer

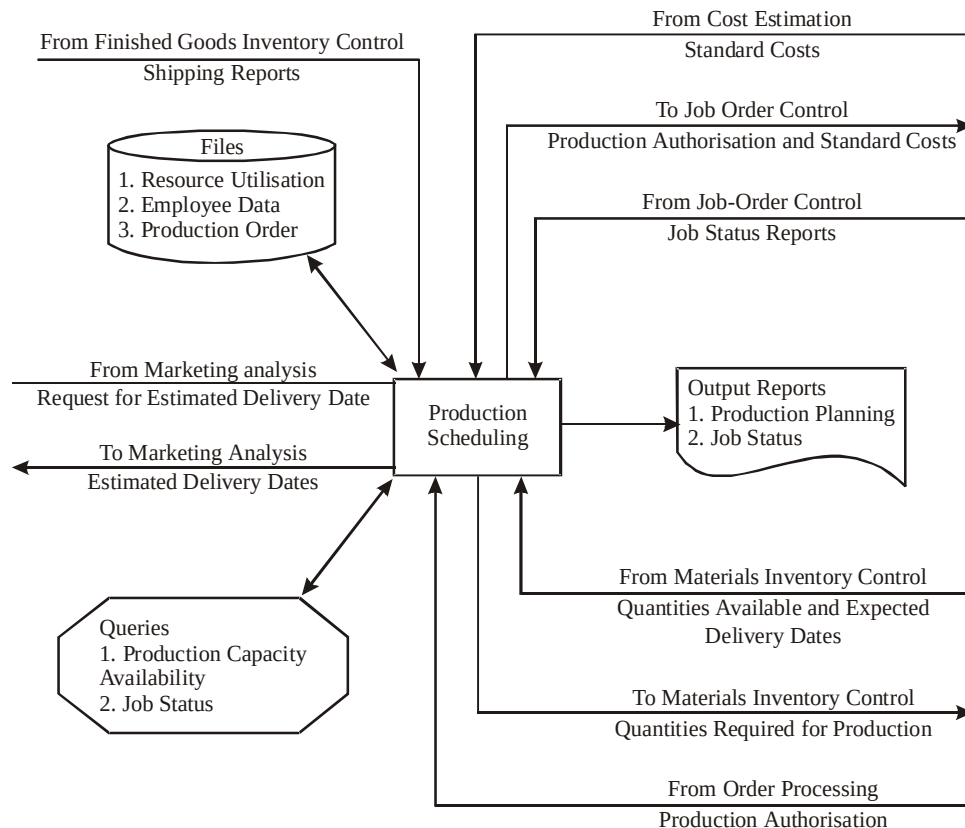
- (a) Production scheduling: It schedules production of components and monitors their progress throughout. It is the nerve centre of the production management system. The information flow involving the production scheduling is given on the next page.

System Interfaces: The production scheduling system interacts with various other systems of the organisation. The sales order processing system authorizes production scheduling to start work on a job. Production scheduling then provides with estimated delivery dates and receives shipping reports from the finished goods inventory control system. Production scheduling informs material inventory control of the items and quantity required to schedule production and inventory control indicates the quantities available. Work in progress (WIP) control receives production authorization from the scheduling system. This authorization creates a new record for a job and production costs can be charged on the job. At the same time, the work-in-process control system receives the standard cost for the job and provides status reports to the scheduling system. Cost estimation provides production scheduling with budgeted standard costs for all jobs production.

Files and Inputs: Three files are required in the production scheduling system. The resource utilization file contains a record for each machine and production process in the factory and maintains work schedules for them. The employee data file contains data concerning employee skills and scheduled work assignments. The production order file

maintains completion date and schedule information for each job.

Reports: The scheduling system produces periodic production planning reports. They include the available capacity and scheduled future utilisation of labour and machinery. Job status reports concern the status of jobs in the production process. They compare scheduled and actual completion time in the production process.



(b) Factors for evaluation of vendor's Proposal : The following factors have to be considered towards rigorous evaluation of the vendor proposal for supply of computer system:

1. The Performance Capability of Each Proposed System in Relation to its Costs: It is imperative that a vendor system be capable of processing the organisation's data within the time frames desired by management. Otherwise, delays in providing needed outputs will occur once the computer system is operational. There are many measures of performance, including speed, response time, number of users supported, and system testing. One way to examine the operating efficiency of a particular system is to use a benchmark test. With this approach, the vendor's

system performs a data processing task that the new system must perform (e.g., payroll processing), and representatives of the organisation then examine the outputs for accuracy, consistency, and efficiency.

2. **The Costs and Benefits of Each Proposed System:** The accountants on the design team will analyze the costs of every vendor's proposed system in relation to the system's anticipated performance benefits – i.e., will perform a cost-benefit analysis for each proposed system. In this effort, the accountants should also investigate the differences between purchasing and leasing each vendor's system. If the steering committee elects to purchase its computer system, the accountants should then advise the committee on a realistic depreciation schedule for the new system.
 3. **The Maintainability of Each Proposed system :** Maintainability refers to the ease with which a proposed computer system can be modified. For example, this flexibility enables a firm to alter a portion of a payroll system to reflect new tax laws.
 4. **The Compatibility of Each Proposed system with Existing Systems:** Compatibility refers to the ability to implement and interface the new system with existing computer resources and software. In some instances, this comes down to hardware issues. For example, it may not be possible to run specific software modules of the new system on some of the company's older local area network servers, which will consequently have to be upgraded. But compatibility issues can also involve the operating system, existing application software, or procedural concerns as well .
 5. **Vendor Support :** Vendor support includes such things as (1) training classes that familiarize employees with the operating characteristics of the new system, (2) help in implementing and testing the new system, (3) assistance in maintaining the new system through a maintenance contract, and (4) backup systems for temporarily processing company data if required. The availability of "business-hours-only" versus "round-the-clock" support is another consideration. Most vendors charge extra for enhanced services.
- (c) **Strategies for change over from manual system to computerized system :** The following strategies are adopted:
- (i) *Direct change over:* Conversion by direct changeover means that on a specified date the old system is dropped and the new system is put into use. This can be successful only if extensive testing is done before hand.

It is risky approach and may cause long delays if error occurs. Users may resent being forced into using an unfamiliar system.
 - (ii) *Parallel conversion:* This refers to running the old system and the new system at the same time, in parallel. Both systems are run simultaneously for a specified period of time and the reliability of results is examined. When the same results are gained over time, the new system is put into use and the old one is stopped.

The advantage includes the possibility of checking new data against old data. It also offers a feeling of security to users who are not forced to make abrupt changes. However, cost of running two systems is high and at the same time workload also increases. With a given choice between two systems, employees will continue to use old system because of their familiarity with it.

- (iii) *Gradual conversion*: In this plan, the volume of transactions is gradually increased as the system is phased in. It combines the best features of the earlier two plans. However, it takes too long time to get new system in place.
- (iv) *Modular conversion*: This approach uses the building of modular, operational prototypes to change from old system to new in a gradual manner. As each module is modified and accepted, it is put into use. In this manner, each module is tested thoroughly and users also get familiarised. However, special attention is required to be paid to interfaces so that the modules being built actually work as a system.
- (v) *Distributed system*: In this method, one entire conversion is done at one site. When that conversion is successfully completed, other conversions are done for other sites. It is most popular in banking industry or in franchises etc. This approach requires that peculiarities of each site should be handled properly.

Question 5

- (a) *What is the significance of input validation control? Describe briefly three different levels of input validation controls used in computerized information system.*
- (b) *Explain the various criteria used for evaluation of the ERP packages.*
- (c) *Describe briefly five components of a CASE work bench.* (10 + 5 + 5 = 20 Marks)

Answer

- (a) **Input Validation Controls**: These controls are intended to detect errors in transaction data before the data are processed. Validation procedures are most effective when they are performed as close to the source of the transactions as possible. However, depending on the type of Computer Based Information Systems (CBISs) in use, input validation may occur at various points in the system. For example, some validation procedures require making references against the current master file. Computer Based Information Systems (CBISs) using real-time processing or batch processing with direct access master files can validate data at the input stage. Some validation procedures are performed by each processing module prior to updating the master file record.

There are three levels of input validation controls:

- (i) **Field Interrogation**: It involves programmed procedures that examine the characters of the data in the field.

The following are some common types of field interrogation:

- (1) **Limit Check**: It may be applied to both the input data and the output data. The field is checked by the program to ensure that its value lies within certain

predefined limits. For example, no pay where there is sick leave, physical balance can never go below zero etc.

- (2) **Picture checks:** These check against entry into processing of incorrect characters. For example, all rooms are numbered by numeric. An incorrect room number 4D3 would be filtered.
 - (3) **Valid Code checks:** These checks are made against predetermined transactions codes, tables 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 digits:** A customers' account number or any other numeric digits are checked for transcription and transposition errors.
 - (5) **Arithmetic check:** Arithmetic check is performed in different ways to validate the results of other computations of the values of selected data fields.
 - (6) **Cross checks:** These may be employed to verify fields appearing in different files to see that the results tally. For example, the quantity received, quantity invoiced by the supplier and quantity ordered may be compared. It may also be necessary to put check on the units of quantity.
- (ii) **Record Interrogation:**
- (1) **Sequence checks** are exercised to detect any missing transactions, off serially numbered vouchers or erroneous sorting.
 - (2) **Format completeness checks** are used to check the presence and position of all the fields in a transaction. This check is particularly useful for variable data field records.
 - (3) **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 want to compare, say first five characters of the customer's name.
 - (4) **Password:** It is used to authorize users to access, read and write information.
- (iii) **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. Various types of checks employed are:
- (1) **Internal label checks:** These checks verify that the file processed is the one the program is actually calling for. To ensure that the correct file is processed, the system matches the file name and serial number in the header label with the programme's file requirements. If the wrong file has been loaded, the system will send a message and suspend operation.
 - (2) **Version checks** are used to verify that the version of the file being processed is correct as per the programme's requirement.

- (3) Expiration date check prevents a file from being deleted before it expires. To protect against destroying an active file by mistake, the system first checks the retention period contained in the header label. If the retention period has not yet expired, the system will generate error message.
- (b) Evaluation of ERP Packages: The following criteria are considered:
- (1) Flexibility: The ERP package should enable organisations to respond quickly by leveraging changes to their advantage, letting them concentrate on strategic expansion to address new products and markets.
 - (2) Comprehensive: It should be applicable across all sizes, functions and industries. It should have in-depth features in accounting and controlling, production and materials management, quality management, plant maintenance etc. It should be open and modular. It should embrace an architecture that supports component or modules that can be used individually expandable in stages to meet the specific requirements of the business.
 - (3) Integrated: It should overcome the limitations of traditional hierarchical and function oriented structure. It should be able to integrate workflow of business events and processes across departments enabling workers to receive right information and right documents at right time.
 - (4) Beyond the company: It should support and enable inter-enterprise business processes with customers, suppliers, bank etc. to create complete logistical chains.
 - (5) Best business practice: The software should enable integration of all business operations in an overall system for planning, controlling and monitoring and offer a choice of multiple readymade business processes including best business practices that reflect the experiences, suggestions and requirements of leading companies across industries.
- (c) Components of A CASE Workbench:
- (1) *A diagram editing system* that is used to create data flow diagrams, structure charts, entity relationship diagrams etc. It captures information about these entities and saves this information in a central responsibility.
 - (2) *Design analysis and checking facilities* that process the design and correct errors. These are integrated with the editing system so that the users may be informed of errors during diagram creation.
 - (3) *Query language facilities* that allow the user to browse the stored information and examine completed designs.
 - (4) *Data dictionary* that maintains information about named entities in a system design.
 - (5) *Report generation facilities* that take information from the central store and automatically generate system documentation.
 - (6) *Forms generation tools* that allow screen and document formats to be specified.

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- (7) *Import/export facilities* that allow interchange of information from the central repository with other development tools.
- (8) *Some systems support skeleton code generation* which generates codes or code segments automatically from the design captured in the central store.

Question 6

- (a) *What do you mean by Information Security policy? Explain the salient features of the Information Security Policy.*
- (b) *Describe the various security components available in a Secure Operating system.*
- (c) *Suggest suitable guidelines to be followed for efficient form design.*

(10 + 5 + 5 = 20 Marks)

Answer

- (a) **Information Security Policy :** Security policy defines acceptable behaviours and the reaction of the organisation when such behaviours are violated. The electronic trading, viruses affecting organisation's security documents and the misuse of credit cards have increased and this has augmented the need for security management. Also, legislation relating to information technology is becoming more prolific, with many countries enacting laws on issues such as copyright and software privacy, intellectual property and personal data. These commercial, competitive and legislative pressures require the implementation of proper security policies.

A good security policy should suggest procedures and policies that can prevent losses and also help in saving money and increasing productivity. The security policy defines ways in which resources in a computer system may be accessed and used. Security policies might differ depending upon the system under consideration.

Features of Information Security Policy: The security objectives and core principles provide a framework for the first critical step for any organization-developing a security policy. The security policy should support and complement existing organizational policies. The thrust of the policy statement must be to recognize the underlying value of, and dependence on, the information within an organization. The information security policy should describe:

- Importance of information security to the organisation
- A statement from the chief executive officer in support of goals and principles of effective information security.
- Specific statements indicating minimum standards and compliance requirements for specific areas.
- Asset classifications.
- Data security
- Personnel security

- Physical, logical and environment security
 - Communications security
 - Legal, regulatory and contractual security
 - System development and maintenance life cycle requirements
 - Business continuity planning
 - Security awareness, training and education
 - Security breach detection and reporting requirements
 - Violation enforcement provision
 - Definitions of responsibility, accountability for information security and proper separation of duties
 - Reporting responsibilities and procedures.
- (b) Operating System Security: Operating system security involves policy, procedures and controls that determine who can access the operating system, which resources they can access, and what actions they can take. The following security components are found in secure operating system:
- (i) Log-on Procedure: A log-on procedure is the first line of defence against unauthorised access. When the user initiates the log-on process by entering user id and password, the system compares the ID and password to a database of valid users. If the system finds a match, then log-on attempt is authorised. If password or ID is entered incorrectly, then after a specified number of attempts, the system should lock out the user from the system.
 - (ii) Access token: If the log on attempt is successful, the OS creates an access token that contains key information about the user including user ID, password, user group and privileges granted to the user. The information in the access token is used to approve all actions attempted by the user during the session.
 - (iii) Access control list: This list contains information that defines the access privileges for all valid users of the resource. When a user attempts to access a resource, the system compares his or her ID and privileges contained in the access token with those contained in the access control list. If there is a match, the user is granted access.
 - (iv) Discretionary Access Control: The system administrator usually determines who is granted access to specific resources and maintains the access control list. However, in distributed system, resources may be controlled by the end-user. Resource owners in this setting may be granted discretionary access control, which allows them to grant access privileges to other users. For example, the controller who is owner of the general ledger grants read only privilege to the budgeting department while accounts payable manager is granted both read and write permission to the ledger.

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- (c) Guidelines for form Design: Forms are pre-printed papers, which elicit and capture information required and often serve as source documents for the data entry personnel.

The following guidelines should be observed in order to design useful form.

- (i) Making forms easy to fill: To reduce errors, speed up completion and facilitate entry of data, it is essential that forms should be easy to fill out.
 - Proper flow can minimise time and effort.
 - It should be from left to right and top to bottom.
 - Divide forms in logical sections consisting of heading, identifications and access instructions, body, signature and verification and comments.
 - Clear captioning is another technique to make work easy.
- (ii) Meeting the intended purpose: Forms are created to serve one or more purposes such as recording, processing, storing and retrieving of information for various departments. It should be able to provide the information required by different departments while avoiding duplication of information.
- (iii) Ensure accurate completion: Error rates associated with collecting data can drop sharply when forms are designed to assure accurate completion. Various controls such as internal double check with column and row totals, summing to same number can be embedded to ensure that forms are filled accurately.
- (iv) Keeping forms attractive: An aesthetic form draws people to encourage proper completion. Forms should look uncluttered, organised and logical even after they are filled in. To be attractive, forms should elicit information in the expected order. Using different fonts makes it attractive and forces people to fill in correctly. Type fonts and lines weights are useful

Question 7

Write short notes on any four of the following:

- (i) *Firewalls.*
- (ii) *Top down approach of system development.*
- (iii) *Material requirement planning.*
- (iv) *Source program library control.*
- (v) *Sources of packaged software.* (5 × 4 = 20 Marks)

Answer

- (i) **Firewalls:** Organisations connected to the Internet or other public networks often implement an electronic “firewall” to insulate their Intranet from outside intruders. A firewall is a system that enforces access control between two networks. Firewalls can be used to authenticate an outside user of the network, verify his or her level of access authority, and then direct the user to the program, data, or service requested. In addition

to insulating the organisation's network from external networks, firewalls can also be used to insulate portions of the organisation's Intranet from internal access. There are a number of firewall products on the market. Generally two types of firewalls are used:

- (a) Network level firewalls: These provide low cost and low security access control. These consist of screening router that examines the source and destination addresses that are attached to incoming message packets. The firewall accepts or denies access request based on filtering rules that have been programmed. These firewalls are insecure because they are designed to facilitate the free flow of information rather than restrict it. Using IP spoofing, hacker can disguise their message packets to look as if they came from an authorised user and thus gain access to the host's network.
 - (b) Application level firewalls: These provide high level of customizable network security but is extremely expensive. These systems are configured to run security applications called proxies that permit routine services such as e-mail to pass through but can perform sophisticate functions such as logging or user authentication for specific tasks. If an outside user attempts to connect, the network administrator can be notified immediately.
- (ii) Top Down Approach of system development: The top down approach assumes a high degree of top management involvement in the planning process and focuses on organisational goals, objectives and strategies. The logic here is that, above all, an information system needs to be responsive to and supportive of an organisation's basic reasons for being. Hence the organisation's goals should be the driving force behind development of all the computer systems. Thus, using top down approach, we begin analysing objectives and goals of the organisation and end by specifying application programs and modules that are needed to be developed.

Various steps in top-down approach are as follows:

- (a) Analyse the objectives and goals of the organisation in terms of profit, growth, diversification etc.
 - (b) Identify the functions of the organisation and explain how they support the entire organisation.
 - (c) Ascertain major activities, decisions and functions at various levels of hierarchy. It should be analysed what decisions are made and what need to be made.
 - (d) Identify models that guide managerial decision process and find the information requirements for activities and decisions.
 - (e) Prepare specific information processing programs in detail and modules within these programs. Also identify files and database for applications.
- (iii) Material Requirements Planning: A major cause of production inefficiency in organisations is a lack of integrated production planning, production scheduling, and production control information systems. One approach to improve production efficiency is materials requirements planning (MRP.) which integrates several production related

information systems so that MRP system can access and extract data from these systems to accomplish production scheduling. MRP's purpose is to greatly improve both inventory management and production scheduling.

To achieve the efficiencies of which they are capable, MRP systems require high levels of discipline-such as not requisitioning materials long before they are needed, proper scrap reporting, and using well-defined procedures for implementing and recording changes promptly. Accurate input data also is absolutely necessary; for example inventory quantity data must be accurate, and interplant transfers must be recorded accurately and promptly.

The benefits of a successful MRP system include:

1. Significantly decreased inventory levels and corresponding decreases in inventory carrying costs.
 2. Fewer stock shortage, which cause production interruptions and time-consuming schedule juggling by managers,
 3. Increased effectiveness of production supervisors and less production chaos.
 4. Better customer service-an increased ability to meet delivery schedules and to set delivery dates earlier and more reliably.
 5. Greater responsiveness to change. MRP gives manufacturing a better feel for the effects of economic swings and changes in product demand can be translated into schedule changes quickly.
 6. Closer coordination of the marketing, engineering, and finance activities with the manufacturing activities.
- (iv) Source Program library controls : In large computer systems, application program modules are stored in source code form on magnetic disks called the source program library (SPL).

To control the SPL, protective features and procedures must be explicitly addressed. This requires the implementation of SPL management system. This software is used to control four critical functions.

- o Storing programs on the SPL.
- o Retrieving program for maintenance purposes.
- o Deleting obsolete programs from the library.
- o Documenting program changes to provide an audit trail of the changes.

SPLMs may be supplied by the computer manufacturer as part of operating system or may be purchased through software vendors. An SPL requires specific planning and control techniques to ensure program integrity. The following control techniques may be used:

- Password control : One form of access control over the SPL is provided by assigning passwords. Every financially significant program stored in the SPL can be

assigned a separate password. However, passwords have drawbacks. When more than one person is authorized to access a program, preserving the secrecy of a shared password is a problem.

- Separation of Test Libraries : Under this concept, a strict separation is maintained between the production programs that are subject to maintenance in the SPL and those being developed. Production programs are copied into the programmer's library for maintenance and testing purposes only. Direct access to the production SPL is limited to a specific librarian group that must approve all requests to modify, delete, and copy programs. Passwords for production programs can be changed regularly and disclosed only on a need-to-know basis.
- (v) Sources of packaged software : Today, packaged softwares are available in the market from various sources. Computer manufacturers, large and small software houses and computer retail stores are some of the sources from where these packages can be purchased. Another source of packaged software is user groups or associations of users of a particular computer system. User groups often recognise the need for a specific program, which may be developed by one member organisation and made available to other members. For example, utility program and extensions of existing operating systems are typically developed by a member organisation and distributed through the user group. Buying packaged software is risky. Some are difficult to install. There may be undetected bugs in the software, which may create problem at a later stage for the purchaser. Many packages may not be adequately developed and tested. The best method is to deal only with those suppliers who are known for their reputation and who provide after sales support such as training, answering queries and correcting program defects.