

**INTERMEDIATE EXAMINATION  
GROUP II  
(SYLLABUS 2008)**

**SUGGESTED ANSWERS TO QUESTIONS  
DECEMBER 2014**

**Paper-9 : OPERATION MANAGEMENT AND INFORMATION SYSTEMS**

Time Allowed : 3 Hours

Full Marks : 100

The figures in the margin on the right side indicate full marks.

**OPERATION MANAGEMENT**

Answer question No. 1 which is compulsory and any two questions from the rest.

1. (a) Put an appropriate word in blank position : 1 × 5 = 5
- (i) -----focuses on such areas as inventory goals and wages budgets.
  - (ii) IBFS is optimal and unique when all numbers in the .....are non-negative.
  - (iii) The investment on machines in a straight line layout is .....than the investment on machines in a functional layout.
  - (iv) .....refers to the heating and cooling operations which are usually applied to induce softening.
  - (v) .....machines are often kept to reduce the loss due to the breakdown of a key machine.
- (b) Expand the following: 1 × 4 = 4
- (i) AQL (ii) SRAC
  - (iii) NET (IV) CRAFT
- (c) Examine each statement and indicate whether it is 'True' or 'False'. 1 × 5 = 5
- (i) A special purpose Machine Tool performs only a limited number of specialised operations with great speed and precision.
  - (ii) Strikes and lock-out are controllable factors affecting Capacity Planning.
  - (iii) Incentives are substitute for lower wages.
  - (iv) Linear Programming does not consider uncertainties
  - (v) Depending on the need, the maintenance activity may be centralized or decentralized.

**Answer:**

1. (a)
- (i) Short-range planning
  - (ii) Net Evaluation Table
  - (iii) Higher
  - (iv) Annealing
  - (v) Standby

- (b) (i) AQL- Acceptable Quality Level

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- (ii) SRAC – Short Run Average Cost
- (iii) NET – Net Evaluation Table
- (iv) CRAFT – Computerized Relative Allocation of Facilities Techniques

- (c) (i) TRUE
- (ii) FALSE
- (iii) FALSE
- (iv) TRUE
- (v) TRUE

2. (a) Mention when the following trucks are used: 4

- (i) Forklift truck
- (ii) Reach trucks
- (iii) Stackers
- (iv) Stillage trucks

(b) In a transformer, it is observed that the voltage of secondary winding is 115 volts and the number of turns in primary coil and secondary coil are 250 and 500 respectively. Calculate the voltage of primary winding, and derive whether it is a 'step-up' or 'step-down' type of transformer. 3

(c) The probabilities of failure  $P_n$  of an equipment in the  $n^{\text{th}}$  period after maintenance have been estimated as follows:

n	1	2	3	4
$P_n$	0.1	0.2	0.4	0.3

Cost of preventive maintenance : ₹150

Cost of breakdown maintenance : ₹100

Determine the optimum frequency of preventive maintenance. 5

(d) Maximise  $3x_1 + 2x_2$  under the following restrictions: 6

- $x_1 \geq 0, x_2 \geq 0$
- $2x_1 + x_2 \leq 40$
- $x_1 + x_2 \leq 24$
- $2x_1 + 3x_2 \leq 60$

**Answer:**

2. (a)

- (i) Forklift Truck: A generic term covering all types of trucks capable of using forks to lift pallets.
- (ii) Reach trucks : These are used where the forks are telescopic to facilitate stacking.
- (iii) Stackers: These are designed in such a way that they can be operated from batteries or mains in a fixed position.
- (iv) Stillage trucks: A stillage is a simple form of pallet, usually disposable and therefore cheaply constructed. Stillage trucks are usually hand-operated trucks.

2. (b)

Given,

$N_1$  = number of turns in primary coil = 250

$E_2$  = voltage of secondary winding = 115

$N_2$  = number of turns in secondary coil = 500

In a transformer,

$$\frac{E_1}{E_2} = \frac{N_1}{N_2}$$

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So,  $E_1 = \text{voltage of primary winding} = \frac{N_1}{N_2} \times E_2 = \frac{250}{500} \times 115 = 57.5 \text{ volts}$

As  $E_2$  is greater than  $E_1$  it is a 'step up' type of transformer

2. (c) (i) Assumed that equipments that fail are replaced just before end of the week.  
 (ii) Actual percentage of failures during the period for equipments of same age is same as the expected percentage of failure during the period for them.

Period	Prob. Of failure $P_n$	No. of replacements made at the end of $n^{\text{th}}$ period	Cost of breakdown maintenance	Cost of preventive maintenance	Total cost maintenance	Cost per period
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	0.1	0.1	$0.1 \times 100 = 10$	150	160	160
2	0.2	$0.2 + (0.1 \times 0.1) = 0.21$	$0.21 \times 100 = 21$	150	$160 + 21 = 181$	$181/2 = 90.5$
3	0.4	$0.4 + (0.1 \times 0.2) + (0.21 \times 0.1) = 0.441$	$0.441 \times 100 = 44.10$	150	$181 + 44.10 = 225.10$	$225.10/3 = 75.03$
4	0.3	$0.3 + (0.1 \times 0.4) + (0.21 \times 0.2) + (0.441 \times 0.1) = 0.4261$	$0.4261 \times 100 = 42.61$	150	$225.10 + 42.61 = 267.71$	$267.71/4 = 66.93$

Therefore optimum frequency of preventive maintenance is once in 2 periods and expected cost of maintenance is ₹230

2. (d)

By introducing slack variables in constraints, we get

$$2X_1 + X_2 + S_1 + 0S_2 + 0S_3 = 40$$

$$X_1 + X_2 + 0S_1 + S_2 + 0S_3 = 24$$

$$2X_1 + 3X_2 + 0S_1 + 0S_2 + S_3 = 60$$

and the objective function (Z) now can be represented by

$$Z = 3X_1 + 2X_2 + 0S_1 + 0S_2 + 0S_3$$

Now, the following tableaus are to be prepared to get the optimal solution:

**Tableau I**

		$C_j$	3	2	0	0	0	
Profit	Programme	Constant	$X_1$	$X_2$	$S_1$	$S_2$	$S_3$	Ratio
0	$S_1$	40	2	1	1	0	0	20
0	$S_2$	24	1	1	0	1	0	24
0	$S_3$	60	2	3	0	0	1	30
	$Z_j$	0	0	0	0	0	0	
	<b><math>C_j - Z_j</math></b>		3	2	0	0	0	

Since,  $C_j - Z_j$  is most positive for  $X_1$ , so  $X_1$  is the entering vector.

Now we calculate the Min. Ratio, from where we find that  $S_1$  is the departing vector.

**Tableau II**

		$C_j$	3	2	0	0	0	
Profit	Programme	Constant	$X_1$	$X_2$	$S_1$	$S_2$	$S_3$	Ratio
3	$X_1$	20	1	$\frac{1}{2}$	$\frac{1}{2}$	0	0	40
0	$S_2$	4	0	$\frac{1}{2}$	$-\frac{1}{2}$	1	0	8
0	$S_3$	20	0	2	-1	0	1	10
	$Z_j$	60	3	$\frac{3}{2}$	$\frac{3}{2}$	0	0	
	<b><math>C_j - Z_j</math></b>		0	$\frac{1}{2}$	$-\frac{3}{2}$	0	0	

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Since,  $C_j - Z_j$  is most positive for  $X_2$ , so  $X_2$  is the entering vector.  
 Now we calculate the Min. Ratio, from where we find that  $S_2$  is the departing vector.

**Tableau III**

		$C_j$	3	2	0	0	0	
Profit	Programme	Constant	$X_1$	$X_2$	$S_1$	$S_2$	$S_3$	Ratio
3	$X_1$	16	1	0	1	-1	0	
2	$X_2$	8	0	1	-1	2	0	
0	$S_3$	4	0	0	1	-4	1	
	$Z_j$	64	3	2	1	1	0	
	$C_j - Z_j$		0	0	-1	-1	0	

Since all  $C_j - Z_j$  are either zero or negative, optimal solution is attained at  $X_1 = 16$  and  $X_2 = 8$  and maximum profit  $Z_j = 64$ .

**Alternative Answer:**

**Tableau I**

		$C_j$	3	2	0	0	0	
Profit	Programme	Constant	$X_1$	$X_2$	$S_1$	$S_2$	$S_3$	Ratio
0	$S_1$	40	2	1	1	0	0	20
0	$S_2$	24	1	1	0	1	0	24
0	$S_3$	60	2	3	0	0	1	30
	$Z_j$	0	0	0	0	0	0	
	$Z_j - C_j$		-3	-2	0	0	0	

Since,  $Z_j - C_j$  is most negative for  $X_1$ , so  $X_1$  is the entering vector.  
 Now we calculate the Min. Ratio, from where we find that  $S_1$  is the departing vector.

**Tableau II**

		$C_j$	3	2	0	0	0	
Profit	Programme	Constant	$X_1$	$X_2$	$S_1$	$S_2$	$S_3$	Ratio
3	$X_1$	20	1	$\frac{1}{2}$	$\frac{1}{2}$	0	0	40
0	$S_2$	4	0	$\frac{1}{2}$	$-\frac{1}{2}$	1	0	8
0	$S_3$	20	0	2	-1	0	1	10
	$Z_j$	60	3	$\frac{3}{2}$	$\frac{3}{2}$	0	0	
	$Z_j - C_j$		0	$-\frac{1}{2}$	$\frac{3}{2}$	0	0	

Since,  $Z_j - C_j$  is most negative for  $X_2$ , so  $X_2$  is the entering vector.  
 Now we calculate the Min. Ratio, from where we find that  $S_2$  is the departing vector.

**Tableau III**

		$C_j$	3	2	0	0	0	
Profit	Programme	Constant	$X_1$	$X_2$	$S_1$	$S_2$	$S_3$	Ratio
3	$X_1$	16	1	0	1	-1	0	
2	$X_2$	8	0	1	-1	2	0	
0	$S_3$	4	0	0	1	-4	1	
	$Z_j$	64	3	2	1	1	0	
	$Z_j - C_j$		0	0	1	1	0	

Since all  $Z_j - C_j$  are either non - negative or zero, optimal solution is attained at  $X_1 = 16$  and  $X_2 = 8$  and maximum profit  $Z_j = 64$ .

**3. (a) Mention the different techniques which are used for improving productivity in industry.**

**5**

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- (b) The demand of a certain item is random. It has been estimated that the monthly demand of the item has a normal distribution with a mean of 680 and a standard deviation of 130 units. The unit price of the item is ₹10 per unit; the ordering cost is ₹ 20. The inventory carrying cost is estimated to be 25 per cent per year. The procurement lead time is constant and is one week. Find the most economic ordering policy and the expected total cost of controlling inventory, given that the service level is 97.5%. [Z for 97.5% service level may be taken as 2.] 6
- (c) List the various objectives of maintenance. 4
- (d) What are the features of Kinetic Pumps? 3

**Answer:**

3. (a)

1. Method Study.
2. Motion and time study.
3. Ergonomics (or Human Engineering).
4. Network Analysis-PERT/CPM etc. for planning.
5. Value Analysis.
6. Statistical Quality Control (SQC).
7. Operation Research-Linear Programming etc.
8. Inventory control.
9. Budgetary control.
10. Management by objectives (MBO)

3. (b)

Economic Order Policy involves determination of EOQ, ROL and Safety Stock for a year.

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2 \times 680 \times 12 \times 20}{0.25 \times 10}} \\ &= 361 \text{ (appx.) units} \end{aligned}$$

$$\begin{aligned} \text{ROL} &= \text{Consumption during lead time} + \text{Safety stock} \\ &= 680 \div 4 + \text{ZLT.} \end{aligned}$$

$$\text{LT} = \text{S.D. during lead time} = \sqrt{\text{Variance During Lead time}} = \sqrt{\frac{16900}{4}} = 130/2 = 65 \text{ units.}$$

$$\text{Safety stock} = 2 \times 65 = 130 \text{ units}$$

$$\text{ROL} = 680/4 + 130 = 300 \text{ units}$$

Expected total cost of inventory per annum:

$$\text{Procurement cost} = ₹ 10 \times 680 \times 12 = ₹ 81,600$$

$$\begin{aligned} \text{Ordering cost} &= (\text{Annual Demand} / \text{EOQ}) \times (\text{Ordering cost} / \text{Order}) \\ &= (680 \times 12 \times 20) / 361 = ₹ 452 \text{ (apx.)} \end{aligned}$$

$$\begin{aligned} \text{Inventory carrying cost} &= \text{Average inventory} \times \text{inventory carrying cost} \\ &= (\text{EOQ}/2 + \text{Safety stock}) \times 0.25 \times ₹ 10 \\ &= (361/2 + 130) \times 0.25 \times ₹ 10 = ₹ 776 \text{ (apx.)} \end{aligned}$$

$$\text{Total variable cost} = ₹ 452 + ₹ 776 = ₹ 1,228.$$

3. (c)

The objectives of maintenance are:

- (i) To keep all the production facilities and other allied facilities such as building and

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- premises, power supply system, etc in an optimum working condition
- (ii) To ensure specified accuracy to products and time schedule of delivery to customers
  - (iii) To keep the down time of the machine at minimum, so that the production program is not disturbed
  - (iv) To keep the production cycle within the stipulated range
  - (v) To modify the machine tools to meet the augmented need for production
  - (vi) To improve productivity of existing machine tools and to avoid sinking of additional capital
  - (vii) To keep the maintenance cost at a minimum as far as possible, there by keeping the factory Overheads at minimum,
  - (viii) To extend the useful life of plant and machinery, without sacrificing the level of performance.

3. (d) The features of Kinetic Pumps are:-

- Continuous energy addition
- Conversion of added energy to increase in kinetic energy (increase in velocity)
- Conversion increased velocity to increase in pressure
- Conversion of Kinetic head to Pressure Head
- Meet all heads like Kinetic, Potential, and Pressure

4. (a) A manufacturing enterprise has introduced a bonus system of wage payment on a slab – rate based on cost of production towards labour and overheads. The slab – rate being-

1% - 10%	saving in production cost	5% of saving
Between 11%-20%	saving in production cost	15% of saving
Between 21%-40%	saving in production cost	30% of saving
Between 41%-70%	saving in production cost	40% of saving
Above 70%	saving in production cost	50% of saving

The rate per hour for three workers A, B, C are ₹5, ₹6 and ₹6.25 respectively. The overhead recovery rate is 500% of production wages and the material cost is ₹30 per unit. The standard cost of production per unit is determined at ₹150 per unit.

If the time taken by A, B, C to finish 10 units is 25 hours, 30 hours and 18 hours respectively, what is the amount of bonus earned by the individual workers and actual cost of production per unit? 6

- (b) Expand FMS and state its key components. 3
- (c) Give the formula for calculating the following: 2
  - (i) Performance of the department
  - (ii) Frequency of breakdowns
- (d) You are appointed to provide consulting services to a plant for planning its layout. State the objectives of a good plant layout. 7

Answer:

4. (a)

	A	B	C
Units produced	10	10	10
Wage rate	5.00	6.00	6.25
Time taken	25 hours	30 hours	18 hours

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Wage payable	125.00	180.00	112.5
Overhead recovery	625.00	900.00	562.5
Materials	300.00	300.00	300.00
Total cost of production (i)	1050.00	1380.00	975.00
Standard cost of production	1500.00	1500.00	1500.00
Saving in cost of production	450.00	120.00	525.00
% of savings	30%	8%	35%
Bonus slab	30%	5%	30%
Bonus Amount (ii)	135.00	6.00	157.50
Actual cost of production (i)+(ii)	1185.00	1386.00	1132.50
Cost/unit (₹)	118.50	138.60	113.25

4. (b) FMS – Flexible manufacturing System  
The key components of an FMS are:
- (i) Several computers controlled machining centres or workstations having CNC machines and robots for loading and unloading.
  - (ii) Computer controlled transport system (AGVs) for moving materials and parts from one machine to another and in and out of the system.
  - (iii) Computer controlled robots for loading and unloading stations.
  - (iv) An automated storing and retrieval system.
4. (c) (i) Performance of the department =  $(\text{Hours worked for maintenance}) / (\text{Scheduled hours}) \times 100$   
(ii) Frequency of break downs =  $(\text{Number of break downs}) / (\text{Available machine hours})$
4. (d) The following are the objectives of a Good Plant layout-
- Efficient utilisation of labour reduced idle time of labour and equipments,
  - Higher flexibility (to change the layout easily),
  - Higher utilisation of space, equipment and people (employees),
  - Improved employee morale and safe working conditions,
  - Improved flow of materials, information and people (employees),
  - Improved production capacity,
  - Reduced congestion or reduced bottleneck centres,
  - Reduced health hazards and accidents,
  - Reduced material handling costs,
  - To allow ease of maintenance,
  - To facilitate better coordination and face-to-face communication where needed,
  - To improve productivity,
  - To provide ease of supervision,
  - To provide product flexibility and volume flexibility,
  - To utilise available space efficiently and effectively.

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## Information Systems

Answer Question No. 5 which is compulsory and any two questions from the rest.

5. (a) Put an appropriate word in blank position: 1×5=5
- (i) A.....system is a system which does not have any interaction with outside environment.
  - (ii) Rectifying the failure of a particular module of the computer to put back the machine in working condition falls under.....maintenance.
  - (iii) In DBMS, the statements like insertion, deletion, updation of rows in a table are part of.....language.
  - (iv) ..... may be defined as the use of parties, external to the organisation, to provide goods or services to the organisation.
  - (v) .....is a tool for developing a program for a given problem.

- (b) Each statement below is either 'True' or 'False'. Indicate the same in your answers. 1×5=5
- (i) RPG is a Procedure-Oriented Language.
  - (ii) Firewalls can protect the system from virus.
  - (iii) Implementation of ERP involves replacement of all existing Information Systems.
  - (iv) Encryption is a process of converting a text into a scrambled form by the use of some mathematical function.
  - (v) Sequential files are suited for on-line inquiry processing.

- (c) Match words in Column I with Column II: 0.5×8=4

Column I	Column II
(A) Assembly Language	(i) Direct Access Sector Device
(B) Gopher	(ii) ERP Package
(C) Rules	(iii) Internet protocol
(D) OLAP software	(iv) Telephone Exchange
(E) Trap door	(v) 'Just-in-time' information delivery
(F) Disk	(vi) Low level language
(G) QUAD	(vii) Access to system by passing normal systems control
(H) Circuit switching	(viii) One of the components of a decision table and refers to the unique combinations of condition

**Answer:**

5. (a) (i) Closed  
(ii) Breakdown  
(iii) Data Manipulation  
(iv) Outsourcing  
(v) Algorithm

- (b) (i) FALSE  
(ii) FALSE  
(iii) TRUE  
(iv) FALSE  
(v) FALSE

- (c) Match word in Column I with Column II:

Column I	Column II
(A) Assembly Language	(vi) Low level language



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(B) Gopher	(iii) Internet protocol
(C) Rules	(viii) One of the components of a decision table and refers to the unique combinations of conditions
(D) OLAP software	(v) 'Just-in-time' information delivery
(E) Trap door	(vii) Access to system by passing normal systems control
(F) Disk	(i) Direct Access Sector Device
(G) QUAD	(ii) ERP Package
(H) Circuit switching	(iv) Telephone Exchange.

6. (a) **'Structured programming means the art of developing programs in a structured fashion to make it readable and maintainable.'** Mention the rules to be followed to develop it. 2
- (b) **List the characteristics of an Information System.** 2
- (c) **What are the different criteria for File Organization in a system?** 6
- (d) **Mention the purposes of the following controls in Processing Environment:** 6
- (i) **Limit Check** (ii) **Input Coding**
- (iii) **Output Control** (iv) **Hashing**
- (v) **Exception Report** (vi) **Control Total**
- (e) **What is the purpose of Integration testing?** 2

**Answer:**

6. (a) The rules of structured programming are as follows:
- A. Logical flow will have one entry and one exit.
- B. Three basic structure:
- Sequence of execution (DO)
  - If – GOTO
  - If – Then – Else
- C. No haphazard use of branching using GOTO
- D. Top-down or bottom-up approach
6. (b) The characteristics of an Information System are specific objective, structured, Components, Integrated, Life Cycle, Behaviour and Self-regulatory.
6. (c) File organization in a System depends on the following criteria:
- (i) File Activities - It indicates the number of successful attempts of having access to records in the files during the course of a process of operation. File activity in mathematical terms is a ratio as given under:  
 File activity = No. of records accessed / No of records in the file  
 If file activity is high, direct or ISAM file organization is better.
- (ii) File volatility - Volatility is the rate of change in the records in the file. Generally, volatility is considered for master file.
- (iii) File Size - large file handling is easy in sequential mode. In earlier days, when hardware cost was high, the preference was for sequential file. Now, the need of processing is considered to be most important.

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- (iv) Back up - Back up provision for sequential file is easy. Back up of sequential file can be kept both in magnetic tape or hard disk.
- (v) Batch processing - Generally in case of batch processing, both master file and transaction files are created following sequential file organisation and processing is done at a particular point of time. The batch processing, file activity is high but file volatility is low.
- (vi) On-line processing - Generally on line processing involves high file activity and requires fast access provision to make processing faster. In that case, Random or ISAM organisation is suitable.
6. (d)
- (i) Limit Check- To ensure correctness of figure by a check of logical limit of value of single transaction.
- (ii) Input Coding - To ensure correct codification of data item. This is done validity checking of codes in the program.
- (iii) Output Control - To check the output control figures generated by machine with the corresponding input control figures.
- (iv) Hashing - Use of codes in place of name of person or party to avoid disclosure of confidential information.
- (v) Exception Report - To identify the input data which are logically invalid
- (vi) Control Total - Control total is generated by the computer during processing to allow checking with the input control total.
6. (e) Integration Testing refers to evaluation of groups of program modules to determine whether:
- interfaces are working properly.
  - specified requirements are met,
  - there is any degeneration under high workloads, and
  - processing is carried out efficiently
7. (a) **What is Information? What are the characteristics of useful Information?** **3+5**
- (b) **Expand the following:** **6**
- (i) **DRAM**
- (ii) **EGA**
- (iii) **BPR**
- (iv) **APIs**
- (v) **HTTP**
- (vi) **ISACA**
- (c) **Draw diagrams illustrating Hierarchical database and Network Database.** **2+2**

### Answer:

7. (a) Information is nothing but refined data. Data before processing is said to be raw data. Raw data are collected, screened and processed to make it organized for effective use. Data after processing become linked with other data and carry meanings and, strictly speaking, to be termed as information. Information is data that has been processed into a form that is meaningful to the user in effective interpretation and decision making. Information involves communication and reception of intelligence. Information consists of data, text, images, voice etc. The

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term data in normal sense includes all these.

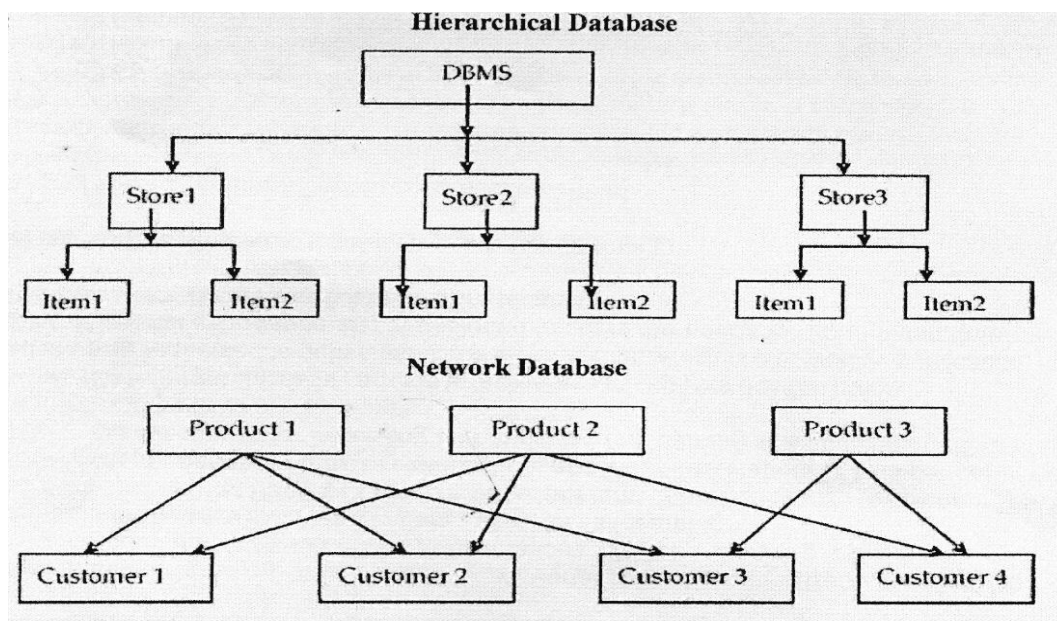
Characteristics of useful Information:

- ✓ Timeliness - This parameter is important to increase effectiveness in the use.
- ✓ Accuracy - The most important ingredient for quality of information.
- ✓ Comprehensive - Information should be integrated one with all other related issues to make it more meaningful.
- ✓ Relevance - The need for type of information differs from user to user. Relevant information filtered for a purpose ensures its effective and best use.
- ✓ Understand ability - The information must be presented in a form that users can interpret the same for decision making.

(b) Expand the following:

- (i) DRAM - Dynamic Random Access Memory
- (ii) EGA - Enhanced Graphics Adapter
- (iii) BPR - Business Process Re-engineering
- (iv) APIs - Application Programming Interfaces
- (v) HTTP - Hyper Text Transfer Protocol
- (vi) ISACA - Information System Audit and Control Association

7. (c)



8. Write short notes on any six:

3×6 =18

- (i) Advantages of Data Mining
- (ii) Models used for representing the Information
- (iii) Main features of Client Server architecture
- (iv) Centralized Architecture

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(v) Programmed decision making

(vi) Generalised Audit Programmes that can be used as audit tools

(vii) Characteristics of secondary storage device

(viii) Sub systems in Finance Module in ERP System

**Answer:**

**8. (i) Advantages of Data Mining**

- It provides finite set of values of variables with other relevant information to understand their trend and behaviour
- It determines the significant and possible variations in the variables
- It helps in building predictive model for future values of target variables
- It is a guiding force for proper decision making

**8. (ii) Models used for representing the Information**

Iconic scale model: It is physical replica of the system based on different scale from original. Iconic models may appear to scale in three dimensions - such as model of a production process, building, car or an aircraft.

Analytical model: It may be a model for a physical system but the model differs from actual system. Example - Map showing water, mountain etc. by different colours.

Mathematical Model: It represents a data set in the form of graph, picture or frictional diagram. It uses highly mathematical or statistical algorithm to interpret data of huge volume with ease. The algorithm varies depending on the complexity of analysis of data sets and the type of analysis.

**8. (iii) Main features of Client Server architecture**

- It is network based architecture
- Supported by good communication system
- Users are well dispersed
- GUI based operating system
- DBMS software is used
- Open-database connectivity driver (ODBC) and Application Programming Interfaces (APIs)

**8. (iv) Centralized Architecture**

Under this kind of architecture, a single central processor-mainframe or mini computer is located at a central location and the processing is being done there. Workstations are placed at different locations for feeding transaction data from there itself.

These workstations can avail the feedback information after processing at central computer. Client/ server architecture which is widely being used to-day follows the same concept of information management.

**8. (v) Programmed decision making**

Programmed decision making refers to those decision making process which are based on some standard set of procedure established by the management and according to scientific principle of management. In case of programmed decision making, supporting information sets and reports are standard, well defined and well structured. Naturally decision making process is simple and based on some

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guidelines. For example, stores ledger summary and material consumption reports may help in decision making on Inventory control.

## 8. (vi) Generalised Audit Programmes that can be used as audit tools

Generalised Audit Programmes which may be procured from the computer vendors/software companies for using computers in carrying out certain audit tasks e.g.

- Search and retrieve
- Test data generation
- Performing arithmetic operations
- Sorting, merging, matching, and comparing
- Copying
- Summarising
- Parallel simulation

## 8. (vii) Characteristics of secondary storage device

1. Mass storage - Large volume of data can be stored. Now in a hard disk, 1 GB to 8GB data can be stored. In a magnetic tape, 150 MB to 250 MB storage capacity is very common.
2. Back up provision - This is a provision of storing of important data files or software in storage device for protection from damage.
3. Non-volatile - Data is not lost due to power failure.
4. Movable storage media - Storage of data in secondary storage device gives a very important facilities that the data set can be ported from one place to another, one machine to another.

## 8. (viii) Sub systems in Finance Module in ERP System

Finance module in an ERP system will have the following sub-systems :

- ❖ Financial Accounting: General Ledger, Accounts Receivable, Accounts Payable, Fixed Assets Accounting etc.
- ❖ Investment Management: Investment Planning, Budgeting, Depreciation, Forecast, Simulation etc.
- ❖ Controlling: Overheads Cost Controlling, Activity Based Costing, Product Costing, Profitability Analysis etc.
- ❖ Treasury: Cash Management, Treasury Management, Market Risk Management, Funds Management etc.