

INTERMEDIATE EXAMINATION

GROUP II

(SYLLABUS 2008)

SUGGESTED ANSWERS TO QUESTIONS

December
2012

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.

SECTION I: OPERATION MANAGEMENT

Answer Question No. 1, which is compulsory and

any two from the rest under Section I.

1. (a) For each part below, choose the most appropriate answer out of the four options given against each part. [1x5]

(i) A final process used in machining cylinder bores, either during manufacture or in re-sizing (re-boring) is called:

- A. Parting, B. Boring, C. Honing, D. Reaming.

(ii) Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:

- A. Routing, B. Dispatching, C. Scheduling, D. Inspection.

(iii) Preventive maintenance is useful in reducing:

- A. Inspection Cost, B. Shutdown Cost, C. Cost of pre-mature replacement, D. Set-up cost of machine

(iv) Computers are better used in Production Control in this area:

- A. Follow-up activity, B. To control labour, C. To disseminate information, D. Loading, scheduling and assignment work .

(v) One limiting level of quality in an acceptance sampling plan is the limit at which the buyer wants to be quite certain that the lot will not be passed is:

- A. Lot Tolerance Percentage Defectives, B. Upper Control Limit, C. Lower Control Limit, D. Acceptable Quality Level.

(b) Examine each statement and indicate whether it is 'True' or 'False' : [1x5]

- (i) Project cost increases as the duration of the project increases.
- (ii) Value engineering aims at reducing work content of a product.
- (iii) With increase in lot size the setup cost per unit decreases, whereas the inventory carrying cost increases.
- (iv) If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.
- (v) A key application of transformers is to reduce the current before transmitting electrical energy over long distances through wires.

(c) Match the terms in Column I with the relevant terms in Column II.:

[0.50 x 8]

Column I	Column II
(A) Production of goods according to orders of customers	(i) Forecasting
(B) Systematic and scientific method of probing the future	(ii) Layout Planning
(C) Includes cleaning, lubrication, periodic overhaul etc.	(iii) Maintenance Stores
(D) Involves decisions about the physical arrangement of economic activity centres within a facility	(iv) Capacity Management
(E) To match the level of operations to the level of demand.	(v) Input-output Analysis.
(F) A mathematical study of an economy in which different production sectors have interdependence.	(vi) Flexible Manufacturing System
(G) Availability of vital spare parts essentially to meet an emergency like breakdown	(vii) Job Production
(H) Automatic handling, loading, and unloading of materials for matching operations.	(viii) Routine Maintenance

Answer 1 (a).

- (i) (C) **Honing** – Honing is used as a process to both remove the final amount of metal to get a cylinder bore to within the required size limits and to put a surface on the cylinder bore which will give good life span, and aid lubrication and oil consumption characteristics in use.
- (ii) (B) **Dispatching** - Dispatching is one of the important production control functions.
- (iii) (B) **Shutdown Cost** - Preventive maintenance tries to minimize the problems of breakdown maintenance. It locates weak parts in all equipments, provide them regular inspection and minor repairs thereby reducing the breakdowns.
- (iv) (D) **Loading, scheduling and assignment work** -
- (v) (A) **Lot Tolerance Percentage Defective** – Risks attached to LPTD are called consumer’s risk. It is one of the limiting factor of Acceptance Sampling.

(b)

- (i) Project cost increases as the duration of the project increases. – True
One of the feature of project is, it has defined start and end dates. If project’s duration time increases, the cost also increases.
- (ii) Value engineering aims at reducing work content of a product. – False
Value engineering relates to the value to be achieved of the Product in given cost. It does not relates to the work content of the Product.
- (iii) With increase in lot size the setup cost per unit decreases, whereas the inventory carrying cost increases. – True.
Because, the size and carrying cost are directly related. If size increases the carrying cost also increased.
- (iv) If the total float value is zero, it means the resources are just sufficient to complete the activity without any delay. – True
If the total float value is negative, it denotes that the resources are not adequate to finish in time. Again, if total float value is Positive, It denotes that resources are in excess or the resources should be reallocated to avoid the delay, otherwise the activity will be delayed by so much of time. If total float value is zero, it means the resources are just sufficient to complete the activity without any delay.

- (v) A key application of transformers is to reduce the current before transmitting electrical energy over long distances through wires. – True

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled wires. By transforming electrical power to a high – voltage and therefore low-current form for transmission and back again afterwards, transformers enable the economic transmission of power over long distances.

(c)

- A. (vii);
- B. (i);
- C. (viii);
- D. (ii);
- E. (iv);
- F. (v);
- G. (iii);
- H. (vi)

2. (a) A defence contractor is evaluating its machine shops current process layout. The figure below shows the current layout and the table shows the trip matrix for the facility. Health and safety regulations require departments E and F to remain at their current positions. [5]

E	B	F
A	C	D

Current Layout

From/To	A	B	C	D	E	F
A		8	3		9	5
B		-		3		
C			-		8	9
D				-		3
E					-	3
F						-

Can layout be improved? Also evaluate using load distance (ID) score.

(b) A company has 50 identical machines in its facilities. The cost of preventive servicing (C_p) is ₹ 20, and the cost of repair after breakdown (C_R) is ₹ 100. The company seeks the minimum cost preventive servicing frequency and has collected the data on breakdown probabilities in the following table: [8]

Probabilities of machine breakdown by month:

Months after servicing that breakdown occurs (i)	Probability that breakdown will occur (P_i)
1	0.10
2	0.05
3	0.05
4	0.10
5	0.15
6	0.15
7	0.20
8	0.20

(c) Expand the following:

- (i) OCC
- (ii) IPPS
- (iii) SRAC
- (iv) CRP
- (v) CRAFT

[1x5=5]

Answer 2.

(a) Keep the departments E and F at the current locations. Because C must be as close as possible to both E and F, put C between them. Place A directly south of E, and B next to A. All of the heavy traffic concerns have been accommodated. Department D is located in the remaining place. The proposed layout is shown in figure below. The load distance (ld) scores for the existing and proposed layout are shown below. As ld score for proposed layout is less, the proposed layout indicates improvement over existing.

E	C	F
A	B	D

Proposed Layout

Dept.Pair	No of Trips (1)	Existing Plan		Proposed Plan	
		Distance (2)	Load x Distance (1x2)	Distance (3)	Load x Distance (1x3)
A-B	8	2	16	1	8
A-C	3	1	3	2	6
A-E	9	1	9	1	9
A-F	5	3	15	3	15
B-D	3	2	6	1	3
C-E	8	2	16	1	8
C-F	9	2	18	1	9
D-F	3	1	3	1	3
E-F	3	2	6	2	6
Total			92		67

(b) Probabilities of machine breakdown by month

Months after servicing that break down occurs (i)	Probability that breakdown will occur (P_i)	(i) x (P_i)
1	0.10	0.10
2	0.05	0.10
3	0.05	0.15
4	0.10	0.40
5	0.15	0.75
6	0.15	0.90
7	0.20	1.40
8	0.20	1.60
	1.00	5.40

The mean time before failure is 5.4 months and the expected cost with no preventive maintenance would be $100 \times (50/5.4) = ₹ 925.93$ per month.

The following calculations show B_j , the expected number of breakdowns between preventive maintenance intervals, for the possible intervals, that may be considered.

$$B_1 = MP_1 = 50(0.10) = 5$$

$$B_2 = M(P_1 + P_2) + B_1P_1 = 50(0.10 + 0.05) + 5(0.10) = 8$$

$$B_3 = 50(0.10 + 0.05 + 0.05) + 8(0.10) + 5(0.05) = 11.05$$

$$\text{Accordingly, } B_4 = 16.75, B_5 = 25.63, B_6 = 35.50, B_7 = 48.72, B_8 = 63.46.$$

The costs of various preventive maintenance intervals are summarized in the table below:

Cost of alternative preventive maintenance intervals –

Number of months between preventive services (j)	Expected number of breakdowns in (j) months (B_j)	Expected cost / month to repair breakdown ($C_R \times B_j / j$)	Cost per month for preventive service every j month $C_R(M)/j$	Total expected cost per month of preventive maintenance and repair
(1)	(2)	(3)	(4)	(5)
1	5.00	500.00	1000.00	1500.00
2	8.00	400.00	500.00	900.00
3	11.05	368.33	333.33	701.66
4	16.75	418.75	250.00	668.75
5	25.63	512.00	200.00	712.60
6	35.50	591.67	166.68	758.34
7	48.72	696.00	142.86	838.86
8	63.46	793.25	125.00	918.25

A policy of performing preventive maintenance every 4 months results in the lowest average cost, about ₹669. This amount is ₹ 227 per month less than ₹ 926 expected cost without preventive maintenance.

This policy would reduce the costs by $(257 \div 926) \times 100 = 27.75\%$ below the cost of repairing the machines only when they breakdown.

(c)

- (i) OCC: Operating Characteristic Curve
- (ii) IPPS: Integrated Production Planning System
- (iii) SRAC: Short Run Average Cost
- (iv) CRP: Capacity Requirement Planning
- (v) CRAFT: Computerized Relative Allocation of Facilities Technique

3. (a) An analyst has observed a job long enough to become familiar with it and has divided it into five elements. The element times for the first four cycles and a performance rating for each element are given in the following table: [1+2+3]

Element	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Performance Rating (%)
1	1.246	1.328	1.298	1.306	90
2	0.972	0.895	0.798	0.919	100
3	0.914	1.875	1.964	1.972	100
4	2.121	2.198	2.146	2.421	110
5	1.253	1.175	1.413	2.218	100

- (i) Do any of the times look like outliers, i.e. probable errors in reading or recording data that should not be included in the analysis?
- (ii) Compute an estimated normal time for the job based on the data available at this stage of the study.
- (iii) On the basis of the data available, what sample size should be taken to estimate the time for element 2 within 5% of the true mean time with 95% confidence?

(b) What are the disadvantages of automation? [3]

(c) What are the main types of Grinders? [2]

(d) The following table gives the running costs per year and resale values of a certain equipment whose purchase price is ₹6,500. At what year is the replacement due optimally? [5]

Year	1	2	3	4	5	6	7	8
Running costs (₹)	1,400	1,500	1,700	2,000	2,400	2,800	3,300	3,900
Resale value (₹)	4,000	3,000	2,200	1,700	1,300	1,000	1,000	1,000

(e) What are the various technical factors involved in the decision for replacement of machines and equipment? [2]

Answer 3.

(a) (i) The times for element 3 in cycle 1 and for element 5 in cycle 4 are suspect and should be disregarded.

(ii) The following estimates are made on the basis of the remaining times:

Element	Mean Actual Time	Performance Rating (%)	Normal Time
1	1.295	90	1.166
2	0.896	100	0.896

3	1.937	100	1.937
4	2.222	110	2.444
5	1.28	100	1.28
			7.723

Normal time for total job = 7.723

(iii) For element 2:

$$\bar{x} = 0.896$$

Here x for element (2) = 3.584

$$s = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n'}{n'-1}} = \sqrt{\frac{3.227174 - (3.584)^2 / 4}{3}} = 0.0728$$

$$n = (Zs/A\bar{x})^2 = \{(1.96 \times 0.0728) / (0.05 \times 0.896)\}^2 = 10.24$$

The analyst probably would want to use more than 10 observations, so that workers would have more confidence in the standard. The Company might make it a general practice to use at least say 15 or more observations.

(b) Disadvantages of automation:

- (i) Heavy capital investment,
- (ii) Displacement of labour,
- (iii) Loss of suggestions from employees,
- (iv) Design specifications for raw materials cannot be relaxed,
- (v) Cost of shutdown of automated plant due to shortage of materials is quite high,
- (vi) Dehumanization.

(c) There are four main types of Grinding Machines in common use:

- (i) The Cylindrical Grinders,
- (ii) The Internal Grinding Machines,
- (iii) The Flat Surface Grinding Machines,
- (iv) The Centre less Grinding Machines.

d) Chart showing Optimal Replacement Period

Year	Net Capital Cost (C - S) (₹)	Running Cost (₹)	Cumulative Running Cost (₹)	Total Cost (₹) (2)+(4)	Average Annual Cost (₹) (5) ÷ (1)
(1)	(2)	(3)	(4)	(5)	(6)
1	2,500	1,400	1,400	3,900	3,900
2	3,500	1,500	2,900	6,400	3,200
3	4,300	1,700	4,600	8,900	2,967
4	4,800	2,000	6,600	11,400	2,850
5	5,200	2,400	9,000	14,200	2,840
6	5,500	2,800	11,800	17,300	2,883

8 ♦ Suggested Answers to Question — OMS

7	5,500	3,300	15,100	20,600	2942.86
8	5,500	3,900	19,000	24,500	3062.50

Here, C= Cost of Capital, S = Resale value

Optimal replacement period is at the end of 5th year.

(e) Technical Factors involved in the decision for replacement of machines and equipment are:

- (i) Inadequacy from the standpoint of range, speed, accuracy, strength, rigidity, output and capacity,
- (ii) Obsolescence and equipment worn-out condition,
- (iii) Special advantage of the new machine as to easiness of set-ups, convenience of operation, safety, reliability performance, control panels and special features.
- (iv) Flexibility and versatility of the machine.

4. (a) Put an appropriate word or two in blank position: [1x5=5]

- (i) Standard time is always more than ----- time.
- (ii) The process in which parts are allowed to cool in still air at room temperature is-----.
- (iii) One of the criteria to evaluate the work done by preventive maintenance is 'Frequency of break downs' which is calculated by the formula-----.
- (iv) Watch and ward personnel are responsible for----- aspects in a factory.
- (v) Lathe is a ----- purpose machine tool.

(b) A shaft 500 mm in length is being machined on a lathe. If the spindle executes 100 r.p.m. and the feed is 0.20 mm per revolution, how long will it take the cutter to pass down the entire length of the shaft? [3]

(c) A manufacturing company has a product line consisting of five work stations in series. The individual workstation capacities are given. The actual output of the line is 440 units per shift.

Workstation No.	1	2	3	4	5
Capacity/ shift	550	650	700	650	600

Calculate (i) System capacity (ii) Efficiency of the production line [1+2]

(d) Explain the objectives of maintenance. [4]

(e) What are the three methods mainly used for finding the optimal solution for a given linear programming problem? [3]

Answer 4.

(a)

- (i) Normal ;
- (ii) Normalizing ;
- (iii) (Number of breakdowns)/ (Available machine hours) ;
- (iv) Security ;
- (v) General

(b) Since the feed is 0.20mm per revolution, the number of revolutions in passing 500mm= 500mm/0.20mm=2,500. Since the spindle executes 100 r.p.m, the time required = 2,500/100= 25min.

(c) (i) The capacity of the system is decided by the workstation with minimum capacity/ shift, i.e., the bottleneck. In the given example, the work station '1' is having a capacity of 550 units/ shift which is minimum.

Therefore, the system capacity = 550units/shift.

(ii) The actual output of the line = 440units/shift.

Therefore, the system efficiency = Actual Output/ System capacity x100 = $440/550 \times 100 = 80\%$

(d) The objectives of maintenance are:

- (i) To keep all the production facilities and other allied facilities such as building and 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, thereby keeping the factory overheads at minimum,
- (viii) To extend the useful life of plant and machinery, without sacrificing the level of performance.

(e) There are numbers of ways of finding the optimal solution for a given linear programming problems. The following three methods are mainly used for this purpose:

- (i) Graphic Method
 - (ii) Simplex Method
 - (iii) Transportation Method.
- (i) **Graphic method** : This method is generally used for solving the problems having two or three variables. Due to this limitation of handling only two or three variables at a time this method has limited application in industrial problems. In practice, two variable cases are easy to solve by this method because three dimensional geometry becomes too complicated to find accurate results.
- (ii) **Simplex Method** : This is the most powerful and popular method for solving linear programming problems. Any problem can be solved by this method which satisfies the conditions of linearity and certainty irrespective of the number of variables. It is an iterative procedure which ultimately gives the optimal solution.
- (iii) **Transportation Method** : This method is used to know the minimum cost of transportation of a product from various origins to different distribution and consumption centres.

SECTION II : INFORMATION SYSTEMS

Answer Question No. 5, which is compulsory and any two questions from the rest, under Section II.

5.(a) Match the terms in Column I with relevant terms in Column II: [0.50 x 8]

Column I	Column II
(A) C++	(i) Repetitive operation based on parameters
(B) Iteration	(ii) Device independent software
(C) Telnet	(iii) Virus hidden inside data or program
(D) Payback period	(iv) Uses single wire
(E) Operating System	(v) A programming language
(F) Serial Transmission	(vi) Remote login
(G) Trojan	(vii) Carried out by the end users
(H) Acceptance test	(viii) Investment decision

(b) For each part below, choose the most appropriate answer out of the four options given against each part: [1x3]

(i) The most important ingredient for quality of information is:

- (A) Relevance; (B) Timeliness; (C) Comprehensive; (D) Accuracy.

(ii) A universally accepted standard protocol for internet communication is:

- (A) FTP; (B) HTTP; (C) TCP/IP; (D) WAIS.

(iii) Buffer stock is built to cater for:

- (A) Fluctuating load; (B) Machine breakdown; (C) Import substitution; (D) Diversification.

(C) Put an appropriate word or two in blank position: [1x4]

(i) ----- basically sends a mail to the e-mail address of the receiver.

(ii) Bootstrapping means loading ----- in compute after switching on the power.

(iii) ----- is the reverse process to convert the scrambled form of text into readable text.

(iv) An OLAP software does the analysis of information from data-----.

(d) Each statement below is either True or False. Indicate the same in your answer: [1x3]

(i) A scanner is both an input and output device.

(ii) Tree topology is a combination of Ring topologies

(iii) Hybrid test is also known as sandwich testing.

Answer 5.

(a)

- A. (v) ;
- B. (i) ;
- C. (vi) ;
- D. (viii) ;
- E. (ii) ;
- F. (iv) ;
- G. (iii) ;
- H. (vii) ;

(b)

- (i) **(D)** Accuracy : The characteristics of quality information are (i) Timeliness, (ii) Accuracy, Comprehensive , (iii) Relevance and (v) Understandability. Among them Accuracy is the most important ingredient for quality of information.
- (ii) **(C)** TCP/IP : TCP is Transmission Control Programme and IP is Internet Protocol. TCP/IP provides end to end connectivity and specifying how data should be formatted, addressed, transmitted, routed and received at the destination.
- (iii) **(A)** Fluctuating Load : Buffer Stock is a supply of inputs held as a reserve to safeguard against unforeseen shortages on demand

(c)

- (i) Mail Server;
- (ii) Operating System ;
- (iii) Decryption ;
- (iv) Warehouse ;

(d)

- (i) **False:** Scanner is an input device. It is a very useful device for digitizing the image of documents.
- (ii) **False:** Tree Topology is a combination of Bus topologies. Several bus LAN 's are joined to a main bus through repeaters and bridges to form a structure of tree. Small Bus based LAN's are like branches.
- (iii) **True:** Hybrid Test is a combination of Top-down and Bottom-up test. So, it is also known a Sandwich testing.

6. (a) What are the various points to be considered before selection of an ERP Package? What are the heads of expenditure that may be incurred for ERP implementation? [4+3]

(b) A company having multiple offices all over India, has decided to install an ERP package for its financial accounting in all offices. Two options were considered: [8]

- (i) a centralized architecture in which the database will be stored centrally in the Corporate Office and all offices will access it via VSAT connectivity, and
- (ii) a decentralized architecture in which each office will maintain its own database, which would periodically be merged at Head Office for consolidation.

What are the advantages and disadvantages of the two architectures?

(c) XYZ Company Pvt. Ltd. extends special discount to its distributors who have business relation for more than 8 years or have business relation for more than 3 years and volume of business is more than ₹ 10 lakh. Draw the Decision Table. [3]

Answer 6.

(a) Selection process of an ERP Package

There are many ERP packages available in the market. Analyzing all the packages for choosing the right one is a time consuming process. Thus, it is better to limit the number of packages at the beginning for the purpose of evaluation. Looking at the product literature of the vendors, one can eliminate the packages that are not at all suitable. Normally this evaluation process is done by a Committee. What is required to be done is gap- analysis between the requirement of the company and capability of the package. Presentation or demo from the selective vendors will provide some direction towards choosing the best. Of course, cost of the package is also a key factor. Cost benefit analysis is also to be done.

The Common Criteria for selection for a package:

1. How best the package fits the requirement of the company.
2. Provision for accommodating the changes in the system.
3. Implementation and Post Implementation support from vendor
4. Reliability of Vendor.
5. Change in Hardware and Skill requirement
6. Cost of the Package and Budget.

Cost of ERP Implementation

A budget is required for implementation of an ERP package. It is not only the cost of ERP package but also there are many hidden costs that are to be considered.

The following costs are to be considered:

1. ERP package cost
2. Consultant cost
3. Cost of Data conversion.
4. Cost of training.
5. Cost of testing.
6. Cost of Post-Implementation support.

(b) Advantages of Centralized Architecture:

- (i) Hardware setup for this architecture is less expensive.
- (ii) This system provides us all the data related to the entire company. Hence at any point of time we can fetch any data from a single point,
- (iii) We can get the consolidated MIS report much faster.
- (iv) Overall control on operations is much compact.
- (v) Database administration is centralized, hence tempering is not possible.

Disadvantages of Centralized Architecture:

- (i) Network setup is very expensive and its maintenance cost is also very high.
- (ii) If the network system breaks down then the entire system will be a handicap.

Advantages of Decentralized Architecture:

- (i) It is an efficient and prompt processing of jobs assigned to different processors.
- (ii) The system can be easily expanded as per requirement, by addition of more units as required.
- (iii) At any particular point we can get, to the point report for a specific data.
- (iv) If any network hazard occurs, the system can run smoothly because the operation can be done from various points.
- (v) Failure of one particular system does not, seriously, affect working of the entire system.

Disadvantages of Decentralized Architecture:

- (i) Hardware setup is expensive
- (ii) Consolidate MIS generation is cumbersome.
- (iii) Database administration is decentralized, hence tempering chance is higher.

(c) Decision Table for Conditions and Actions:

Discount = Yes,

IF

Business Relations for >8 years.

OR

Business Relations for > 3 years

AND

Volume of Business is > ₹ 10 lakhs

		Rules							
		1	2	3	4	5	6	7	8
CONDITION	C1 : more than 8 years of business relation	Y	Y	Y	Y	N	N	N	N
	C 2: more than 3 years of business relation	Y	Y	N	N	Y	Y	N	N
	C3: business volume more than ₹10 Lakhs	Y	N	Y	N	Y	N	Y	N
ACTION	A1 : Discount facility	X	X	X	X	X			
	A2 : No Discount facility						X	X	X

7. (a) Expand the following and write one sentence on each expression to convey its meaning or implication: [1x5]

- (i) GIGO;
- (ii) URL;
- (iii) ALGOL;
- (iv) EIS;
- (v) EEPROM.

(b) (i) What is meant by “user friendly” software? What is a “menu” in software? [2+2]
 (ii) Briefly describe any four program design tools. [4]

(c) For the following organization structure control, you are required to mention the staff responsible for the tasks given: [5]

- (i) Network Maintenance;
- (ii) System Development;
- (iii) Database Administration;
- (iv) Hardware Maintenance;
- (v) Data Security.

Answer 7.

(a)

- (i) GIGO- Garbage In Garbage Out : This word was devised to forewarn the systems people to be all careful for ensuring quality of data for the success of an information system.

- (ii) URL- Uniform Resource Locator : The function of URL is to identify a particular internet resource.
- (iii) ALGOL- Algorithmic Language: This language is developed for mathematical problem solving.
- (iv) EIS – Executive Information System : It is a Decision Support System (DSS) for Executives/ top management of an organization.
- (v) EEPROM – Electrically Erasable Programmable Read Only Memory : This is a special type of PROM which can be erased by electrical charge.

(b) (i) User-friendly software: More and more people who are not computer professionals and not familiar with computer jargons use computers these days. To enable them to use computers, applications are written in such a way that the interface between the user and the application is easy to use. The ease of use of an application is known as “user friendliness”.

A menu is a technique for enhancing user- friendliness of software. It provides the user with options to choose from just like a menu in a restaurant provides the customers a choice of items.

An example of menu is as follows:

New
Open
Save
Save as
Print
Prepare
Send
Publish
Exit.

(ii) Four program design tools are briefly discussed below:

(a) Program flow chart: Program flow chart is among the most common program design tools that managers and users encounter when reviewing the design work of the system development project.

These flow charts depict the logical steps through which a computer program must proceed when solving a problem. At one time, program flow charts were considered the premier program design tool. Although they are still widely used, sometimes it is difficult for programmers to translate a program flow chart directly into a structured code.

A program flow chart depicts the logical processing steps followed by a program quite well.

However, unlike some of the other program design tools, they often do not provide a broad view of how the program is organized. However, they are useful for problems involving mathematical or scientific formulae.

(b) Pseudo code: When reviewing the work done by a program designer, users may also need to review narrative descriptions of a program logic. Pseudo code, like program flow charts, also represents program logic. However , instead of using graphical symbols and flow lines, pseudo code presents program logic in English- like statements. Pseudo code is generally preferred by programmers over flowcharts because it represents program code more closely. Many users also find pseudo code more understandable than program flow charts. Pseudo code is used in a variety of ways. For example many fourth- generation languages use Pseudo code- like statements. Besides using pseudo code to design program code in a 3GL, it can be embedded into a completed 3GL program as non-executable ‘comment’ statements that serve as a documentation to indicate what the program is doing. Pseudo code is particularly useful when designing transaction processing and information – retrieval programs.

- (c) **Structure chart:** Another type of program design tool that a user may review is the program structure chart. Structure charts, which look similar to corporate organization charts, are useful for organizing problems. The structure chart organizes each of the program tasks into well- defined modules. The higher-level modules represent control portions of the program; the lowest level modules do the actual task of the program. Unlike either flow charts or pseudo code, the structure chart does not give any detail of the actual program logic and the order in which various tasks are executed. Instead they show how all the logical functions of the program fir together as a whole.
- (d) **4GL Tools:** The various tools described above were developed as manually applied methods for designing programs or systems. The main drawback of manually applied tools is that they take a lot of time to prepare. Also, when a program flow chart is prepared or a structure chart is drawn, the programmer is not sure if it is internally consistent. Fourth-generation languages provide a way out to remove these obstacles by automating many of these manual tasks by using 4GL tools.

These tools ensure that the work done with them is consistent with the other work performed by the system team. The automation of manual task and internal consistency checks are two reasons due to which productivity gains result from using 4GL tools.

(c)

Task Given	Staff Responsible
i) Network Maintenance	i) Network Specialist
ii) System Development	ii) System Analyst, Programmer
iii) Database Administration	iii) Database Administrator
iv) Hardware Maintenance	iv) Maintenance Engineer
v) Data Security	v) Input/ Output Control Staff

8. Write short notes on any six of the following:

[3x6 = 18]

- (a) Criteria for File Organization;
- (b) Electronic Data Interchange;
- (c) Knowledge Management;
- (d) Different approaches for developing MIS;
- (e) Criteria for selection for a computer system;
- (f) Internet Address;
- (g) Steps involved in BPR;
- (h) Decision hierarchy.

Answer 8.

(a) **Criteria for File Organization:**

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.

- (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 organization 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 organization is suitable.

(b) Electronic Data Interchange (EDI)

Electronic Data Interchange is a process of exchange of structured business information (documents) among various agencies involved in the process of transaction through electronics. Purchase orders, invoices, remittance advice etc. are the documents which need to flow smoothly in the business process. EDI is the service provider in the process.

EDI's job is to receive and transit the documents among the trading partners. Traditional EDI communication route is through value added network (VAN), which is a third party service provider that receives, stores and transmit data. EDI's process comprises three sub-systems:

- (i) **Translation:** EDI software converts files from trading partners into EDI standard format, called EDI document.
- (ii) **Transmission:** EDI documents are transmitted using mutually agreed communication method.
- (iii) **Retranslation:** When a trading partner receives a transaction, it is retranslated with the help of EDI enabled software into format which can be used as its own business document format.

(c) Knowledge Management :

Knowledge is a mix of information, experience, evaluation. Thus, information system in an organization is the key resource on which knowledge base depends. The main function of knowledge management in corporate world involves the process development of minds of decision makers through continuous flow of right kind information and their critical evaluation. Steps involved are:

- Creating the information data base and constant updates.
- Creating technological infrastructure.
- Developing analytical skill.
- Continuous feedback system.
- Creating culture of sharing – exchange of information.
- Capturing knowledge (analytical information and expert opinion).

It is a process of accounting and creating knowledgebase for the organization for facilitating sharing of knowledge by managers for efficient management throughout the organization. The crux in exercise of knowledge management is to transform the data warehouse into knowledge base. Knowledge base means:

- Best company profile.
- Performance measurement tools
- Best control practices.
- Complex business environment parameters.

The knowledge management has demonstrated a good account of success in deriving effective business solution. This tool is in developing process and its potential is enormous in guiding the model management in making decisions relating to market, product, technology and so on.

- It is an intellectual capital.
- Knowledge base is assimilation of best experience and business process.
- It is a collection of effective business solutions history.
- Comprehensive corporate data base.

(d) Different approaches for developing MIS:

For developing, three different approaches are generally practiced which are given below:

Top Down Approach: Top Down Approach starts from the identification of information requirements of different activities of the organization by the top management in order to have information support in strategic and tactical decision making and designing the information system accordingly. Top Management provides the guide lines for basic objectives, policies and plan for developing these sub-systems. In other words, this approach designs a model of information flow and same model is used in developing all the sub-systems under the MIS.

Each Sub-systems will have different modules and they are collectively integrated to form a sub-system. The approach of integration is same for all sub-systems. The implementation of different sub-systems is done on the basis of broad guidelines of the top management. Integration of all sub-systems is done at the end to form a comprehensive MIS for the organization. The implementation process is very scientific, systematic and simple.

Bottom Up approach: In the Bottom Up Approach, each sub-systems for different functional areas like payroll, Sales Management, Production Management, Inventory Control System are developed according to the specifications for each sub-systems on the basis types of input documents, flow of information and output requirements. There is no common approach for system development. Rather, the sub-systems are developed purely on the basis control information requirements for each sub-systems and guidelines generated by the manager of the respective functional areas.

The next step in the bottom up approach is to integrate the information of these sub-systems for a comprehensive MIS for the organization. This step is a complicated one in this approach. The data base structure of different systems, flow of information and links among them are to be understood thoroughly to have proper integration. Sometimes intermediate databases are created to collect all relevant information from different sub-systems for integration.

Integrative Approach: This approach in a more scientific approach for easy integration of sub-systems and takes care of the limitations in the other two approaches described above by way of better planning. Under this system, the top management identifies the information requirements from different sub-systems and specifies other guidelines for integration of these information for effective support to decision making. The managers from different functional areas present the flow of information under individual sub-systems. The aspect of integration of information of different sub-systems is considered at the planning stage. Any modifications required at different points are pre-conceived at the beginning so that they are taken care from the design stage. This approach of implementation allows designing better structure of databases and ensures smooth flow of information at different levels of management of different functional areas.

(e) Criteria for Selection of a Computer:

Following criteria should be considered for selection of a computer:

- (i) Workload- data processing requirements in terms of volume, frequency etc.
- (ii) Operating system capability.
- (iii) Type of application system to be processed.

- (iv) Processing requirements- batch or on-line or distributed data processing etc.
- (v) Network requirement.
- (vi) File/ data base design support- their special features.
- (vii) Software performance, capability and special features.
- (viii) Required data reliability, security and integrity.
- (ix) Reputation of manufacturer.
- (x) Reliability of machine.
- (xi) Cost of machine, delivery, installation.
- (xii) Maintenance cost etc.

(f) Internet Address:

Internet address is assigned to an user. It is for systematic identification of user. It has three parts:

- (i) **IP Address-** It is an unique for a particular machine on a particular network. IP address consists of four sections separated by periods for example 201.204.54.16. IP addressing scheme is agreed by all internet users. IP address is provided by the Internet Service Provider. IP address has the following characteristics:
 - It is globally unique.
 - No two machine can have same IP address.
- (ii) **Domain Name-** Domain name contains two or more components separated by periods. For example, ibm.com, icwai.org, icai.org. The last component stands for the category of domain name as given below:
 - com-Commercial company.
 - org-organization (non-profit making)
 - edu-educational institution
 - net-organization directly involved in internet operation.
 - gov- government organization etc.
- (iii) **URL- Uniform Resource Locator**
Uniform Resource Locator for identification of a particular internet resource.
Generally it has the following structure
Protocol:// server-name .domain-name/directory/filename
For Example, <http://yahoo.com/apk/index.html>.

(g) Steps involved in BPR:

1. Begin Organizational Change
 - Assess the current state of organization
 - Understand the existing process
 - Explain the need for change
2. Develop vision for change and success
 - Communication campaign for change.
 - Making employees understand the need for change.
 - Projections of outcome of change.
 - Remove the fear psychosis on security of job

3. Devising BPR plans and programmes.
 - Evaluate the existing business strategies
 - Discuss the issues relating to customer's desire
 - Identify new business opportunities.
 - Select the processes to be – engineered.
 - Identify potential barriers against implementation
 - Formulate new process performance strategies.
4. Change in work practice and culture
 - Brainstorm using BPR principles
 - Use customer value as focal point
 - Explain the new values and culture required
 - Establish re-engineering teams, cross functional workgroups.
 - Allow the workers to make decisions.
5. Establish new business system
 - Prepare document for new organizational structure
 - Draw new work flow diagram
 - Create model on new process steps
 - Describe new technology specifications
 - Redesigning the information flow requirement
6. Perform the transformation process
 - Develop a migration strategy
 - Map new skill requirements
 - Train the employees on new processes
 - Reallocate the workforce
 - Transform the organization

(h) Decision Hierarchy:

Decision making process follows a well established hierarchy. Different levels of management are involved in different types of decisions. This type of decision depends on the level of responsibility and their controlling activities. Decision may be of different kinds. The diagram showing the decision hierarchy explains lower level management takes decision on operation, whereas middle level on tactical and top management on business strategy.

Top Management- Top management is concerned with strategic decisions like diversification, technology acquisition, new market exploration, strategic business alliance, takeover, merger etc.

Middle Level- Middle level management is generally involved in tactical decision making with the help of performance analysis, budget variance analysis, devising better productivity mechanism and control etc.

Operational Management- Operational management staff are mainly involved in scheduling the activities, keeping track of progress of day –to- day operations and decisions of well structured problems etc.

Strategic decision making is concerned with the issues relating to long-term effect on the business growth and prospect of the organization as a whole and involves both internal and external factors. Strategic decision making process involves the following:

- Assumptions of possible future state of business environment.
- Generating alternative strategies
- Enhancing the problem prevention capabilities.
- Decisions based on different business scenario.

Tactical Decision Making

Tactical decisions are concerned with issues having short-term effect on the business. Primary aim of this type of decision is to effective use of resources, remove any imbalance among different factors of production and improve productivity of factors of production. Often decisions are related to acquisition of resources to help strategic decisions.

Operational Decision Making

Operational decisions are related to the effective use of resources acquired out of tactical decisions and aim of these decisions are to have effective control of the use of resources in day- to – day business activities.

Decisions are directed to achieve the target as decided by tactical decisions.

