

INTERMEDIATE EXAMINATION

SUGGESTED ANSWER TO QUESTIONS

DECEMBER 2011

PAPER – 9 : Operation Management and Information Systems

Time Allowed : 3 Hours

Full Marks: 100

Section I : Operation Management

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

Answer Question No. 1, which are compulsory and attempt any *two* questions from rest, under Section I

**Question No. 1 (a)**

Put an appropriate word in blank position:

[1×5]

- (i) — is the process of polishing a work, after grinding, by means of abrasive materials to give fine finish.
- (ii) — is a type of surface treatment by an electro-chemical process which gives a slight anticorrosion protection and improves the appearance of the product.
- (iii) In formulating the linear programming problem, the basic step is to set up some — model.
- (iv) Under CPM, the project is analysed into different operations or activities and their relationships are determined and shown on the — diagram.
- (v) Wear and — are the two main causes for replacement of machinery.

**Answer to Q. 1 (a)**

(i) Lapping; (ii) Anodizing; (iii) Mathematical; (iv) Network; (v) Obsolescence.

**Question 1 (b)**

Match the terms in Column I with the relevant terms in Column II.

[0.5×8]

Column I	Column II
(A) Inventory Control	(i) Turbo-Alternator

(B) Network Analysis	(ii) Milling Machine
(C) Aviation Fuel	(iii) Shaping Machine
(D) Hydro-electricity	(iv) Crashing
(E) Helical groove on shaft	(v) Value Analysis
(F) Improvement in productivity	(vi) Stock Level
(G) 'V' groove in a Vee-block	(vii) Honing
(H) Very fine finishing of the inside diameter of a cylinder liner	(viii) Refinery

**Answer to Q. 1 (b)**

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

**Question 1 (c)**

For each part below, choose the most appropriate answer out of the four options given against each part: [1×5]

- (i) Cutting tools are produced from:  
(A) High Speed Steel, (B) Nickel, (C) Cobalt, (D) Silica
- (ii) The following establishes time sequence of operations:  
(A) Routing, (B) Sequencing, (C) Scheduling, (D) Dispatching.
- (iii) Arrangement of machines depending on sequence of operations happens in:  
(A) Process Layout, (B) Product Layout, (C) Hybrid Layout,  
(D) Group Technology Layout.
- (iv) Buffer stock is built to cater for  
(A) Fluctuating load, (B) Machine breakdown, (C) Import substitution,  
(D) Diversification
- (v) Linear Programming is a technique used for determining:  
(A) Production Programme, (B) Plant Layout, (C) Product Mix,  
(D) Manufacturing sequence.

**Answer to Q. 1 (c)**

(i) (A) High Speed Steel, (ii) (C) Scheduling, (iii) (B) Product Layout,  
(iv) (A) Fluctuating load, (v) (C) Product Mix.

**Question 2 (a)**

A department of a company has to process a large number of components/month. The process equipment time required is 36 minutes/component, whereas the requirement of an imported process

chemical is 1.2 litres / component. The manual skilled manpower required is 12 minutes/component for polishing and cleaning.

The following additional data are available:

[4+1]

	Availability / month	Efficiency of utilisation
Equipment - hours	500	85%
Imported Chemicals - Litres	1000	95%
Skilled manpower - hours	250	65%

- (1) What is the maximum possible production under the current conditions?
- (2) If skilled manpower availability is increased by overtime by 20%, what will be the impact on production increase?

**Answer to Q. 2 (a)**

- (i) Actual Equipment Hrs. used =  $500 \times 85/100 = 425$  Hrs.  
Possible output =  $425 \times (60/36) = 708$  Components
  - (ii) Imported chemicals =  $1,000 \times 95/100 = 950$  litres actually used;  
Possible output =  $950/1.2 = 792$  Components
  - (iii) Skilled manpower Hrs. used =  $250 \times 65/100 = 162.5$  Hrs.  
Possible output =  $162.5 \times (60/12) = 813$  Components  
The bottleneck capacity = 708 Components.
- (1) Maximum possible production under the given conditions = 708 Components.
  - (2) There will be no impact on production increase if skilled manpower is increased by overtime by 20% as the bottleneck in output is equipment hours.

**Question 2 (b)**

“The term ‘Quality Control’ consists of two words ‘quality’ and ‘control’ ”.

- (i) What are implied by the terms ‘quality’ and ‘control’? (ii) From the discussions under (i), please arrive at a definition of ‘Quality Control’. (iii) Mention six major objectives of ‘Quality Control’.

[3+2+3]

**Answer to Q. 2 (b)**

- (i) ‘Quality’ is that characteristic or a combination of characteristics that distinguishes one article from the other or goods of one manufacturer from that of competitors or one grade of product from another when both are the outcome of the same factory. The main characteristics that determine the quality of an article may include such elements as design, size, materials, chemical composition, mechanical functioning, electrical properties, workmanship, finish

and appearance. The quality of a product may be defined as the sum of a number of related characteristics such as shape, dimension, composition, strength, workmanship, adjustment, finish and colour.

'Control' may be referred to as the comparison of the actual results (finished product) with the predetermined standards and specifications. It locates the deviations and tries to remove them. Control is the correction in the quality of the produce when deviations in the quality are more than expected in the process. Control consists in verifying whether everything occurs in conformity with the plan adopted, the instructions issued and principles established. It has for object to point out weaknesses and errors in order to rectify them and prevent recurrence. It operates on everything – things, people and action.

- (ii) Thus, by the term 'quality control', we mean the process of control where the management tries to conform the quality of the product in accordance with the pre-determined standards and specifications. It is a systematic control of those variables that affect the excellence of the ultimate product.

Quality control may be defined as that industrial management technique or group of techniques by means of which products of uniform acceptable quality are manufactured.

Quality control refers to the systematic control of those variables encountered in a manufacturing process which affect the excellence of the end product. Such variables result from the application of materials, men, machines and manufacturing conditions.

Thus quality control is a technique of scientific management which has the object of improving industrial efficiency by concentrating on better standards of quality and on controls to ensure that these standards are always maintained. In this way, for quality control purposes, first standards and specifications are established and then to see whether the product conforms to those standards.

- (iii) Objectives of quality control: The following are the main objectives of quality control programme:
1. To assess the quality of the raw materials, semi-finished goods and finished products at various stages of production process.
  2. To see whether the product conforms to the predetermined standards and specifications and whether it satisfies the needs of the customers.
  3. If the quality of the products deviates from the specifications, it is required to locate the reason for deviations and to take necessary remedial steps so that the deviation should not be recurred.
  4. To suggest suitable improvements in the quality or standard of goods produced without much increase or no increase in the cost of production. New techniques in machines and methods may be applied for this purpose.
  5. To develop quality consciousness in the various sections of the manufacturing unit.

6. To assess the various techniques of quality control, methods and processes of production and suggest improvement in them to be more effective.
7. To reduce the wastage of raw materials, men and machine during the process of production.

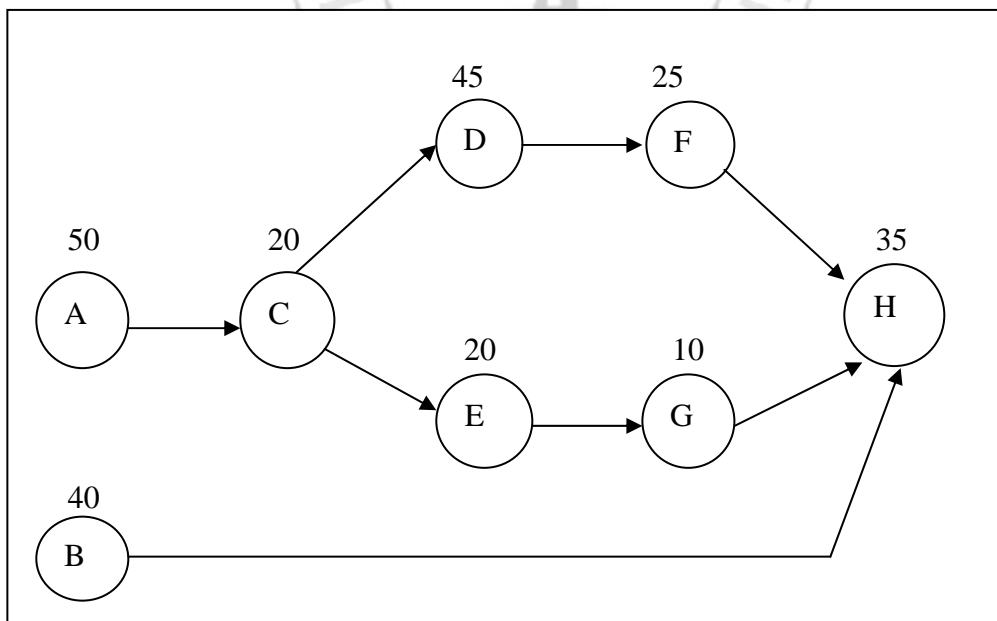
**Question 2 (c)**

Draw the schematic diagram from the following table showing tasks to be performed on an assembly line in the sequence and time specified: [3]

Task	Time (Seconds)	Tasks that must precede
A	50	-
B	40	-
C	20	A
D	45	C
E	20	C
F	25	D
G	10	E
H	35	B, F, G

**Answer to Q. 2 (c)**

**Schematic Diagram**



(Task on node)

**Question 2 (d)**

Replace the 'missing words' with appropriate terms in the formula contained in the following paragraph: [1+1]

"The analytical approach to evaluate the work done by preventive maintenance is

- (i) (Inspections incomplete) / ('missing words')  $\times$  100 should be less than 10%.  
 (ii) (Hours worked for maintenance) / ('missing words')  $\times$  100 = Performance of the department."

**Answer to Q. 2 (d)**

- (i) (Inspections incomplete) / (Inspections scheduled)  $\times$  100 should be less than 10%.  
 (ii) (Hours worked for maintenance) / (Scheduled hours)  $\times$  100 = Performance of the department.

**Question 3 (a)**

A lathe machine is used for turning operation and it takes 40 minutes to process the component. Efficiency of the lathe is 90 per cent and scrap is 20 per cent. The desired output is 600 pieces per week. Consider 48 hours per week and 50 weeks in a year. Determine the number of lathes required? [6]

**Answer to Q. 3 (a)****Part-I**

The output per annum =  $600 \times 50 = 30,000$  units.

The scarp rate is 20%.

$\therefore$  The quantity to be produced (including scarp) =

$$\frac{\text{Required output}}{(1 - \text{Scrap rate})} = \frac{30,000}{(1 - 0.2)} = 37,500 \text{ units}$$

**Part-II**

Total time required for turning =  $37,500 \times 40 / 60$

= 25,000 hours

Production time required with 90 per cent efficiency

=  $25000 / 0.9 = 27,777.8$  hours

**Part-III**

Time available per lathe per annum =  $48 \times 50 = 2400$  hrs

$\therefore$  Number of lathes required =  $\frac{\text{Time required (hrs)}}{\text{Time available (hrs)}} = \frac{27777.8}{2400} = 11.57 = 12$

$\therefore$  No. of lathes required = 12

**Question 3 (b)**

Expand the following:

[1 $\times$ 5]

- (i) EMQ
- (ii) ABFS
- (iii) TCM
- (iv) MBO
- (v) SPM

**Answer to Q. 3 (b)**

- (i) EMQ : Economic Manufacturing Quantity
- (ii) ABFS : Alternative Basic Feasible Solution
- (iii) TCM : Total Cost Management
- (iv) MBO : Management by Objectives
- (v) SPM : Special Purpose Machine

**Question 3(c)**

Please describe the situation where 'Assembly Line Balancing' is required. What are the factors that cause problems in Line Balancing? Suggest the steps in solving the issue. [2+2+3]

**Answer to Q. 3 (c)**

Assembly line balancing is associated with a product layout in which products are processed as they pass through a line of work centres. An assembly line can be considered as a "production sequence" where parts are assembled together to form an end product. Line balancing is the apportionment of sequential work activities into workstations in order to gain a high utilisation of labour and equipment so as to minimise the idle time. For example, the production capacities of two machines A and B are as under for a particular job:  
A 50 pieces/hour; B 25 pieces/hour.  
Now, if only one machine of each is provided, then machine B will produce 25 units/hour where as the machine A can produce 50 units. But because of the sequence, only 25 units are produced per hour, i.e., machine A will work only 50 per cent of its capacity and the remaining 30 minutes in one hour, it is idle. This idle time can be minimised by introducing one more machine of kind B in production line. The operations are carried out at different workstations situated along the line.

The factors that cause problems in Line Balancing are:

1. The finished product is the result of many sequential operations.
2. There is a difference in production capacities of different machines

Steps in solving Line Balancing Problems:

1. Define task.
2. Identify precedence requirements.

3. Calculate minimum number of workstations required to produce desired output.
4. Apply heuristics to assign task to each station.
5. Evaluate effectiveness and efficiency.
6. Seek further improvement.

**Question 4 (a)**

The probabilities of failure  $p_n$  of an equipment in the  $n$ th period after maintenance have been estimated as follows :

[4]

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

Cost of preventive maintenance: ₹ 150

Cost of breakdown maintenance: ₹ 1000

Determine the optimum frequency of preventive maintenance.

**Answer to Q. 4 (a)**

- (i) It has been 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	Probability 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	$0.1 \times 1000 = 100$	150	250	250
2	0.2	$0.2 + (0.1 \times 0.1) = 0.21$	$0.21 \times 1000 = 210$	150	$250 + 210 = 460$	$460/2 = 230$
3	0.4	$0.4 + (0.21 \times 0.1) + (0.1 \times 0.2) = 0.4 + 0.021 + 0.02 = 0.441$	$0.441 \times 1000 = 441$	150	$460 + 441 = 901$	$901/3 = 300.3$



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

**Question 4 (b) (i)**

Explain what is a Slack Variable under Simplex Method of Linear Programming.

[2]

**Answer to Q. 4 (b) (i)**

A slack variable represents costless process whose function is to 'use up' otherwise unused capacity, say, machine time or warehouse capacity. Effectually, the slack variable represents unused capacity, and it will be zero, only if production facilities or capacities are fully utilised. In each constrained equation, the variables used in other equations are also introduced but with zero coefficients. The same slack variables are also introduced in the objectives function but by the time it is maximum, all their coefficient will be zero. Slack variables are always non-negative.

**Question 4 (b) (ii)**

A small manufacturing firm produces two types of gadgets, A and B, which are first processed in the foundry, then sent to the machine for finishing. The number of man-hours of labour required in each shop for the production of each unit of A and B and the number of man-hours the firm has available per week are as follows:

[3]

	Foundry	Machine Shop
Product A: Man-hours / unit	10	5
Product B: Man-hours / unit	6	4
Firm's capacity per week (in hours)	1000	600

Construct the objective function and the corresponding equations for calculating how many units should be produced per week so that the profit is maximum. The profit on the sale of A is ₹ 30 per unit as compared to B's ₹ 20 per unit.

**Answer to Q. 4 (b) (ii)**

The objective function can be developed as follows :

$$Z = 30X + 20Y + 0S_1 + 0S_2;$$

Subject to:

$$10X + 6Y + 1S_1 + 0S_2 = 1000$$

$$5X + 4Y + 0S_1 + 1S_2 = 600$$

**Question 4 (c)**

Examine each statement and indicate whether it is 'True' or 'False':

[1×5]

- (i) Industrial Engineering is not a line function..
- (ii) Ranking is one of the Job Evaluation Techniques.
- (iii) Results available from work sampling study is 100% accurate.
- (iv) Standard time does not allow for relaxation of the operators.
- (v) Incentives are substitutes for lower wages.

**Answer to Q. 4 (c)**

- (i) Industrial Engineering is not a line function. – **True**
- (ii) Ranking is one of the Job Evaluation Techniques. – **True**
- (iii) Results available from work sampling study is 100% accurate. – **False**
- (iv) Standard time does not allow for relaxation of the operators. – **False**
- (v) Incentives are substitutes for lower wages. – **False**

**Question 4 (d)**

A company which is planning to undertake the production of medical testing equipments has to decide on the location of the plant. Three locations are being considered, namely, A, B and C. The fixed costs of three locations are estimated to be ₹ 300 Lakhs, ₹ 500 Lakhs and ₹ 250 Lakhs respectively. The variable costs are ₹ 3000, ₹ 2000 and ₹ 3500 per unit respectively. The average sales price of the equipment is ₹7000 per unit. [2+2]

Find -

- (i) The range of annual production/sales volume for which each location is most suitable.
- (ii) Select the best location, if the sales volume is of 18,000 units.

**Answer to Q. 4 (d)**

Determination of total costs of three locations:

$$\text{Total cost} = \text{Fixed cost} + [\text{volume or quantity produced}] \times [\text{variable cost}]$$

$$= F + x.v \text{ where 'x' is the quantity to be produced and 'v' is the variable cost.}$$

- a. Total cost at A = 3,00,00,000 + 3,000x ..... (1)
- b. Total cost at B = 5,00,00,000 + 2,000x ..... (2)
- c. Total cost at C = 2,50,00,000 + 3,500x ..... (3)

For the various volumes of production, i.e., 5,000, 10,000, 15,000, 20,000 and 25,000 units, the total costs are computed at the three locations as under:

**Table:** Total costs at different volumes for three locations

(₹ in Lakhs)

Volume (Nos.) →	5000	10,000	15,000	20,000	25,000
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A	450	600	750	900	1050
B	600	700	800	900	1000
C	425	600	775	950	1125

(i) Trend from the above Table:

(a) For quantities upto 10,000 units, Location C is most suitable; (b) between 10,000 to 20,000 units, suitable location is A; but beyond 20,000 units, Location B is most economical.

(ii) When the sales volume is 18,000 units, profitability may be drawn as under:

Sl. No.	Item Description	Location		
		A	B	C
1	Sales volume - Units	18,000	18,000	18,000
2	Variable Cost / Unit ₹	3,000	2,000	3,500
3	Total Variable Cost [(1) x (2)] ₹	540,00,000	360,00,000	630,00,000
4	Fixed Cost ₹	300,00,000	500,00,000	250,00,000
5	Total Cost [(3) + (4)] ₹	840,00,000	860,00,000	880,00,000
6	Sales Price / Unit ₹	7,000	7,000	7,000
7	Sale Value [(1) x (6)] ₹	1260,00,000	1260,00,000	1260,00,000
8	Profit [(7) - (5)]	420,00,000	400,00,000	380,00,000

For sales volume of 18,000 units, A is the preferred location.



## Section II : Information Systems

Answer Question No. 5, which is compulsory and any 2 questions from the rest, under Section II

### Question 5 (a)

For each part below, choose the most appropriate answer out of the four given against each part :

[1×5]

- (i) Barcode is:  
(A) Unit used in banking industry; (B) Universal product code;  
(C) Spreadsheet package; (D) Scan graphs.
- (ii) 'Packet switching' on the Internet refers to:  
(A) Type of circuitry; (B) Switching components;  
(C) Method of data movement; (D) Packet of hard copy of documents.
- (iii) Which of the following is NOT an operating system?  
(A) OS/2; (B) Win XP; (C) Oracle; (D) UNIX
- (iv) A network topology where all computers are connected to a central hub is called:  
(A) Ring; (B) Bus; (C) Star; (D) Token
- (v) Assembly language is:  
(A) Machine dependent; (B) Machine independent; (C) Partly dependent and partly independent; (D) Not a programming language

### Answer to Q. 5 (a)

- (i) (B) Universal product code; (ii) (C) Method of data movement; (iii) (C) Oracle;  
(iv) (C) Star; (v) (A) Machine dependent.

### Question 5 (b)

Put an appropriate word in blank position:

[1×5]

- (i) — indicates a sequence of instructions that repeat until a predetermined count or other test is satisfied.
- (ii) An — is a boundary shared by human beings and computer.

- (iii) — means browsing for information over the Internet.
- (iv) In the Windows system, a Folder is a storage area for — .
- (v) Information of a permanent nature is stored in a — file.

**Answer to Q. 5 (b)**

- (i) Loop;
- (ii) Interface;
- (iii) Surfing;
- (iv) Files / Sub-folders
- (v) Master

**Question 5 (c)**

Each statement below is either **True** or **False**. Indicate the same in your answers: [1×4]

- (i) Memory is used to store data, programs and results.
- (ii) Only executable files can be infected by virus.
- (iii) On-line processing and real-time processing are same.
- (iv) Light pens and Joysticks are both pointing devices.

**Answer to Q. 5 (c)**

(i) True; (ii) False; (iii) False, (iv) True.

**Question 6 (a)**

Briefly describe any five program design tools. [5]

**Answer to Q. 6 (a)**

Five program design tools are briefly discussed below :

- (i) 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.
- (ii) Pseudo code: When reviewing the work done by a program designer, users may also need to review narrative descriptions of a program logic. Pseudocode, 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. Pseudocode 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.
- (iii) 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 organisation charts, are useful for organising problems. The structure chart organises 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 fit together as a whole.

- (iv) 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.
- (v) Object oriented programming and design tools: These tools provide a means of enhancing programmer productivity and of reducing the application backlogs common in many organisations. Object oriented software design results in a model that describes object, classes and their relationships to one another. The object-oriented design is often taken from a data flow diagram (DFD). In fact, every input and output screen, every process and data store found in a fully decomposed DFD may be a candidate for an object in an object-oriented design. There is a wide variety of object oriented development tool kits available in the market. By adopting 4GL and object-oriented programming tools, the organisations can decrease their application development time substantially.

### **Question 6 (b)**

A Company sells merchandise to wholesale and retail outlets. Wholesale customers receive a 2% discount on all orders. The Company also encourages both wholesale as well as retail customers pay cash on delivery by offering a 2% discount for this method of payment. Another 2% discount is offered on orders of 500 or more units for all. Draw a decision table for the above conditions and actions. [8]

### **Answer to Q. 6 (b)**

**Decision Table**

		Rules							
		1	2	3	4	5	6	7	8
Condition Stub	Order 500 units or more	Y	Y	Y	Y	N	N	N	N
	Wholesale Outlet	Y	N	Y	N	Y	N	Y	N
	Cash on delivery	Y	N	N	Y	Y	Y	N	N
Action Stub	Offer no discount								√
	Offer 2% discount		√				√	√	
	Offer 4% discount			√	√	√			
	Offer 6% discount	√							

Number of Rules =  $2^n = 2^3 = 8$  (n = no. of conditions)

### **Question 6 (c)**

Expand the following acronyms:

[1×5]

(i) DSS; (ii) SRAM; (iii) HLL; (iv) SDLC; (v) DBMS

**Answer to Q. 6 (c)**

- (i) DSS: Decision Support System.
- (ii) SRAM: Static Random Access Memory.
- (iii) HLL: High Level Language.
- (iv) SDLC: System Development Life Cycle.
- (v) DBMS: Database Management System.

**Question 7 (a)**

What are generally the sub-systems in the Manufacturing Module of an package?

[4]

**Answer to Q. 7 (a)**

Manufacturing Module of an ERP package generally has the following sub-systems:

- Material and Capacity Planning
- JIT/ Repetitive Manufacturing
- Engineering Data Management
- Cost Management
- Quality Management
- Configuration Management
- Tooling etc.

**Question 7 (b)**

What is Integration Testing? What are the different strategies adopted for this?

What are the types of testing approach? How does the auditor satisfy himself in this regard?

[1+1+2+1]

**Answer to Q. 7 (b)**

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.

There may be two different strategies viz. big-bang testing where all inter-module dependencies are tested together and incremental testing where subset of modules are tested in an iterative manner to reach the total group of program modules.

There may be three types of integration testing approach:

Types of test	Detailment
Top-down test	Top level modules are tested first by simulating lower-level dummy modules to confirm the working of the interface correctly.
Bottom-up test	Bottom level modules are tested first by simulating higher-level dummy modules to confirm correctness of the working of the interface.
Hybrid test	It is a combination of top-down and bottom-up test. This is also known as sandwich testing.

Auditor should gather evidence of integration testing and check whether systematic approach was adopted and execution was carried out properly.

**Question 7 (c)**

A consumer wants to purchase a ready-made item on-line by using his credit card. Narrate the steps to complete the transaction and get delivery of the item.

[5]

**Answer to Q. 7 (c)**

A consumer interacts with the online system through web browser. A consumer first interacts then uses hyper link to access a shopping mall. A Shopping mall is where a customer first visits for shopping spree and there may be many pages in the shopping mall. Business process follows the path:

- Consumer selects a store
- Link to the merchant server
- Customer selects an item from the e-shop
- Receipt of payment by supplier through credit card
- Obtain payment authorization
- Physical delivery of the item

**Question 7 (d)**

Match the items in Column I with those in Column II.

[0.5×8]

Column I	Column II
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(A) Inverted Tree	(i) Web sites that allow users to communicate with various other users on-line.
(B) Trap door	(ii) Measure of processing performance
(C) URL	(iii) Hierarchical data structure
(D) MIPS	(iv) Provides information about location of a document
(E) Chat Rooms format	(v) File Attachment
(F) Firewall	(vi) Access to system bypassing normal system control
(G) Top Management	(vii) Strategic Planning
(H) E-mail	(viii) Access Security with Checks in Computer System

**Answer to Q. 7 (d)**

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

**Question 8**

**Write short notes on any six of the following:**

[3×6]

- (a) Fourth Generation Language;
- (b) Client – Server Architecture;
- (c) Audit Trail;
- (d) Cost of ERP Implementation;
- (e) Salient features of LAN;
- (f) Data Mart;
- (g) Executive Information Systems;
- (h) Disaster Recovery.

**Answer to Q. 8**

- (a) **Fourth Generation Language:** The technology of software development has undergone revolutionary changes. With the evolution of sophisticated hardware, the usage of computer has expanded far and wide. To make usage of computer more popular, the tools of software development has been made simpler. Development of wide varieties of data structure is a part and parcel of the evolution process. To reduce the burden of programmer, programming language evolved some user-friendly tools. Like the evolution in hardware, programming language is undergoing developments which has conceptualized as generation in

terms of features, capability and technique. The Fourth generation languages are bracketed as the languages which have the following features:

- It is a combination of simple commands and simple structure.
- It includes decision support facilities with simple what-if structure.
- It supports tools to develop user-friendly software.
- It has facilities of easy handling of databases.

(b) **Client – Server Architecture:** In Client-server processing environment, there is a main machine (may be a main frame) which is called server ( host) and which is connected with several terminals (clients) at different locations for the use by users. The server software accepts data fed from clients and returns the results to the clients. Network mechanism provides access permission to multiple users and allow sharing of peripheral devices. The most important point is taking care of transactions at multiple points on-line and facility of instant updation of database and facilitating the fast dissemination of information to clients users.

In Client Server architecture, the following are the main features:

- 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 and Application Programming Interfaces.

(c) **Audit Trail:** Audit trail refers to a system of designing of an information system in a manner that the historic data and information at any processing stage may be traced to verify the origin, correctness, authenticity, flow and destination including the stages of security procedures for establishment of integrity of data and information.

(d) **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.

(e) **Salient features of LAN:**

- Computing equipments are spread over small geographical area.

- Communication channels between the machines are private
- Server is powerful microcomputer or minicomputer or mainframe.
- LAN file server is a repository of variety of software and data file for the network
- Relatively high capacity communication channels are used
- More reliable in communication.
- Cost of interfacing is usually low.
- Each device in LAN can work independent of network.

(f) **Data Mart:** Data mart is the simple form of data warehousing. In other words, it is a scaled-down version of data warehousing. Data marts of a company are generally created with specific objectives. It may be function specific. The advantages of creation of data mart are low cost and less time requirement. Data marts are created with a specific focus. For example, data marts may be created for marketing department with competitors information only to develop business strategy to improve market share. This kind of approach is meaningful as far as relevant information base is required. Instead of waiting for comprehensive data warehousing, data mart sometimes provide tremendous services to meet immediate and specific information need.

(g) **Executive Information Systems:** An Executive Information System (EIS) is special type MIS meant for top management of an organization. In other words, it is a Decision Support System (DSS) for Executives. Executive decisions are of three types:

- strategic planning, tactical planning and ‘fire-fighting’.

According to CIMA –

An Executive Information System (EIS) is a set of procedure designed to allow senior managers to gather and evaluate information relating to the organization and its environment.

Following are the special features of an EIS :

- It is a specially designed tool to feed executives information need.
- It is an easy - to - use and screen based software .
- It provides the executives to facilities of on-line analysis tools like time series analysis, regression analysis etc.
- It is not limited to internal data only. Access to external sources of data is also provided.
- It provides the facilities to connect to internet
- Information is presented in summary format
- It is a comprehensive information system and work in conjunction with DSS.

- (h) **Disaster Recovery:** Disaster means sudden great misfortunate happening which can not be prevented. Disaster may be of two types – i) Natural like flood, earthquake, hurricane damage etc. ii) Technological like failure of computer, electrical fire etc.

**Disaster Recover Plan:**

The damage under disaster is generally enormous. The question of recovery in case of disaster comes from data. Data may be categorized as critical, vital, sensitive and non-critical. Recover plan may be devised accordingly to given priority of recovery of data of different importance.

**Emergency Action:** In the first stage the notification of damage is to be given to the appropriate agency/authority like fire service, police, insurance company etc. Then following action may be taken depending in the situation to save personnel, equipment, data etc. like:

- sounding alarm bell
- use of fire extinguisher
- saving the back-up of software, data etc.

**Recovery Action:** There needs an advanced planning for recovery of data under disaster. Generally, the disaster recovery planning is done by a Recovery Committee and execution of recovery programmes is done under its supervision and control. These are:

- Backup Application software and backup of databases at a regular interval to be preserved in some other location.
- Mirror imaging of disk.
- Selection of alternative computer system.
- Restoration of application software and databases in the new computer system.
- Critical evaluation of performance of the application software.
- Assessment of loss of databases.
- Plan for recovery of data loss etc.

