

# INTERMEDIATE EXAMINATION

## GROUP II

(SYLLABUS 2008)

### SUGGESTED ANSWERS TO QUESTIONS

JUNE 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 are compulsory and **any two** questions from the rest, under Section I.

**Q. 1. (a)** For each part below, choose the most appropriate answer out of the four options given against each part : [1×5]

(i) One of the product examples for Line Layout is :

(A) Repair Workshop, (B) Welding shop, (C) Engineering College, (D) Cement.

(ii) The card which is prepared by the dispatching department to book the labour involved in each operation is :

(A) Labour card, (B) Wage card, (C) Credit card, (D) Job card.

(iii) Jigs are used in machine tool for holding :

(A) Tools, (B) Work piece, (C) Head stock, (D) Tail stock.

(iv) Cost reduction can be achieved through :

(A) Work sampling, (B) Value analysis, (C) Quality assurance, (D) Supply chain management.

(v) Addition of value to raw materials through application of technology is :

(A) Product, (B) Production, (C) Advancement, (D) Transformation.

2 ♦ Suggested Answers to Question — OMS

(b) Put an appropriate word or two in blank position : [1×5]

- (i) \_\_\_\_\_ is a Single Purpose Machine Tool designed for cutting gears.
- (ii) A key application of \_\_\_\_\_ is to reduce the current before transmitting electrical energy over long distance through wires.
- (iii) \_\_\_\_\_ is a technique for determining the quantity and timing for the acquisition of dependent demand items needed to satisfy master production schedule requirements.
- (iv) To evaluate the work done by preventive maintenance, \_\_\_\_\_ is derived at from the total time of stoppage of the machine for scheduled and unscheduled maintenance work.
- (v) In linear programming, the word 'linear' establishes certain relationships among different \_\_\_\_\_ .

(c) Match the terms in Column I with the relevant terms in Column II. [0.5×8]

Column I	Column II
(A) Making a cylindrical hole in an object	(i) Lathe
(B) Joining two metallic objects	(ii) Value Analysis
(C) Heat Treatment	(iii) Flow Diagram
(D) Thread in a nut	(iv) Machine Data Card
(E) To reduce movement of materials	(v) Riveting
(F) To study one operator one machine	(vi) Drilling
(G) Shortest processing time	(vii) Hardening
(H) Brain storming	(viii) Scheduling

**Answer 1. (a)**

- (i) **(D) Cement** — Line layout is suitable in plants manufacturing standardised products on mass scale like cement, paper, chemical etc.
- (ii) **(D) Job card** — A job card gives detail of job to be performed in a production facility.
- (iii) **(A) Tools** — It controls location or motion of another tool.
- (iv) **(B) Value analysis** — It is systematic analysis that identifies and selects best alternatives for designs, materials, processes & systems.
- (v) **(B) Production** — It is the act of manufacturing goods.

**Answer 1. (b)**

- (i) Hobbing machine
- (ii) Transformer
- (iii) MRP (Materials Requirement Planning)
- (iv) Down time
- (v) Variables

**Answer 1. (c)**

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

**Q. 2. (a)** Location A would result in annual fixed costs of ₹ 3,00,000, variable costs of ₹ 63 per unit and revenues ₹ 68 per unit. Annual fixed costs at Location B are ₹ 8,00,000, variable costs are ₹ 32 per unit and revenues are ₹ 68 per unit. Sales volume is estimated to be 25,000 units/year. Calculate BEP for each location and determine which location will be attractive. [2+3]

**(b)** The faculty in a college is planned to rise to strength of 50 staff members and then to remain at that level. The wastage of recruits depends upon their length of service and is as follows :

Year	1	2	3	4	5	6	7	8	9	10
Total % age who left upto the end of year	5	35	56	65	70	76	80	86	95	100

- (i) Find the number of staff members to be recruited every year.
- (ii) If there are seven posts of Head of Deptt. for which, length of service is the only criterion of promotion, what will be the average length of service after which a new entrant should expect promotion? [5+3]

**(c)** Expand the following : [1×5]

- (i) BOLT
- (ii) DNC
- (iii) CBA
- (iv) FMS
- (v) LOB

**Answer 2. (a)**

Location A: BEP (units)  $\frac{3,00,000}{68-63} = 60,000$  and Location B: BEP (units)  $\frac{8,00,000}{68-32} = 22,222$ .

4 ♦ Suggested Answers to Question — OMS

At the expected demand of 25000 units, profits (loss) for the alternative are :

Alternatives	A	B
Revenue ₹	17,00,000	17,00,000
Costs :		
Variable ₹	15,75,000	8,00,000
Fixed ₹	3,00,000	8,00,000
Total Cost	18,75,000	16,00,000
Profit/(Loss) ₹	(1,75,000)	1,00,000

Location B is most attractive, even though annual fixed costs are much higher than A.

**Answer 2. (b)**

Let us assume that the recruitment per year is 100. From above it is clear that the 100 who join in the first year will become zero in 10<sup>th</sup> year; the 100 who join in the 2<sup>nd</sup> year, will serve for 9 years and become 5 at the end of the 10<sup>th</sup> year, and the 100 who join in the 3<sup>rd</sup> year, will serve for 8 years and become 14 at the end of the 10<sup>th</sup> year and so on. Thus, when the equilibrium is attained, the distribution of length of service of staff members will be as under :

Year	No. of staff members
0	100
1	95
2	65
3	44
4	35
5	30
6	24
7	20
8	14
9	5
10	0
Total	432

- (i) Thus if 100 staff members are recruited every year, the total number of staff members after 10 years of service = 432

To maintain a strength of 50, the number to be recruited every year =  $\frac{100}{432} \times 50 = 11.6$

It is assumed that those staff members who completed 'x' years' service but left before 'x+1' years' service, actually left immediately before completing 'x+1' years.

If it is assumed that they left immediately after completing 'x' years' service, the total number will

become 432-100=332 and the required intake will be  $50 \times \frac{100}{332} = 15$

In actual practice they may leave at any time in the year so that reasonable number of Recruitments per year =  $\frac{11.6+15}{2} = 13$  (app)

- (ii) If we recruit 13 persons every year, we want 7 seniors. Hence if we recruit 100 every year, we shall require =  $\frac{7}{13} \times 100 = 54$  (approx.) seniors.

It can be seen that 54 seniors will be available if we promote them during 6th year of their service ( $\because 0+5+14+20+24 = 63 > 54$ ).

$\therefore$  The promotion of a newly recruited staff member will be due after completing 5 years and before putting in 6 years of service.

**Answer 2. (c)**

- (i) BOLT : Build, Operate, Lease and Transfer
- (ii) DNC : Direct Numerical Control
- (iii) CBA : Cost Benefit Analysis
- (iv) FMS : Flexible Manufacturing System
- (v) LOB : Line of Balance

**Q. 3. (a)** M/s Kambu Ltd. are the manufacturers of Lamps. The following are the details of their operation during 2011 : [2×5]

- Average monthly market demand 2,000 lamps
- Ordering cost ₹ 200 per order
- Inventory carrying cost 20% per annum
- Cost of lamps ₹ 1000 per lamp
- Normal usage 100 lamps per week
- Minimum usage 50 lamps per week
- Maximum usage 200 lamps per week
- Lead time to supply 4 - 6 weeks

Compute from the above :

- (i) Economic order quantity.
- (ii) If the supplier is willing to supply quarterly 1,500 units at a discount of 10%, is it worth accepting?
- (iii) Maximum level of stock.
- (iv) Minimum level of stock.
- (v) Re-order level of stock.

(b) What are the different stages of Technology Life Cycle? [4]

(c) Mention eight different techniques which are used for improving productivity in industry. [4]

**Answer 3. (a)**

(i) Economic Order Quantity :

Annual usage of lamps (Co) = Normal usage per week × 52 weeks  
 = 100 lamps × 52 weeks  
 = 5,200 lamps.

Ordering cost per order (O) = ₹ 200.

Inventory carrying cost per unit per annum (C<sub>c</sub>) = 20% of ₹ 1000 = ₹ 200.

$$EOQ = \sqrt{\frac{2 Co O}{C_c}} = \sqrt{\frac{2 \times 5200 \text{ units} \times ₹ 200}{₹ 200}}$$

= 102 units (app)

(ii) **Evaluation of order size of 1500 units at 10% discount**

No. of orders = 5200 units/1500 units = 3.46 or 4.	
Ordering cost per year at ₹ 200 per order	₹ 800
Carrying cost of average inventory :	
$\frac{1500 \text{ units}}{2} \times (\text{₹ } 1000 \text{ less } 10\%) \times \frac{20}{100}$	1,35,000
Total annual cost (excluding item cost)	1,35,800
Annual cost if EOQ (102 units) is adopted	₹
Ordering cost: 5200/102 or 51 orders per year @ ₹ 200 per order	10,200
Carrying cost of average inventory 102 units/2 × ₹ 1000 × (20/100)	10,200
Total annual cost (excluding item cost)	20,400
Increase in annual cost : ₹ (135800 – 20400)	1,15,400
Amount of quantity discount : 10% × ₹ 1000 × 5200 units =	5,20,000

Since the amount of quantity discount (₹ 5,20,000) is more than the increase in total annual cost (₹ 1,15,400), it is advisable to accept the offer. This will result in saving of ₹ (5,20,000-1,15,400) or ₹ 4,04,600 p.a. in inventory cost.

(iii) Maximum Level of Stock

= Re-order level + Re-order quantity – (Minimum usage × Minimum reorder period)

= 1200 units + 102 units – (50 units × 4 weeks) = 1,102 units

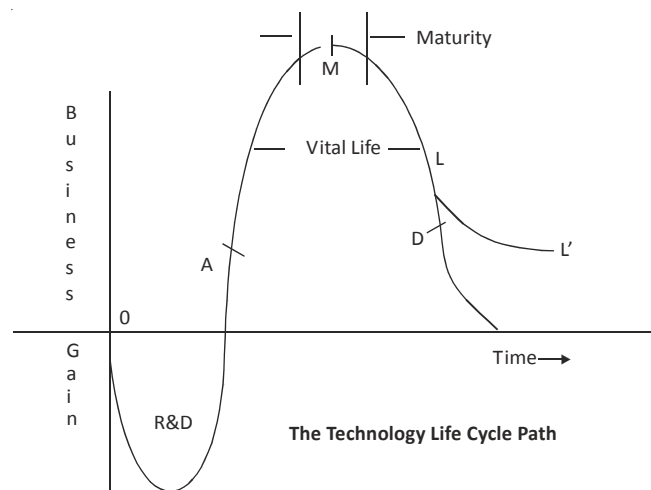
- (iv) Minimum Level of Stock  
 = Re-order level – (Normal usage × Normal delivery period) (See Note below)  
 = 1200 units – (100 units × 5 weeks) = 700 units  
**Note** : Normal delivery period is taken to be average delivery period
- (v) Re-order Level of Stock  
 = Maximum usage × Maximum delivery period = 200 units × 6 weeks = 1,200 units.

**Answer 3. (b)**

The Technology Life-Cycle (TLC) describes the commercial gain of a product through the expense of research and development phase, and the financial return during its “vital life”. The technology life cycle is concerned with the time and cost of developing the technology, the time line of recovering cost and modes of making the technology yield a profit proportionate to the costs and risks involved. The TLC may, further, be protected during its cycle with patents and trademark seeking to lengthen the cycle and to maximize the profit from it.

Technology Life Cycle comprises of 4 stages, viz., Innovation, Syndication, Diffusion and Substitution.

- (i) **Innovation** : This stage, in turn, comprises of three stages, namely Intelligence, Design and Choice.  
**Intelligence stage** — involves creation of a product or technology through pure research, applied research market research, brain storming etc., and selection through preliminary screening and feasibility analysis.  
**Design stage** — involves development of the process or technology through which the concept could be given shape and Design and Testing are then done before final launching /adoption.  
**Choice** of the desired product/technology paves the way for finally launching the same in the market.
- (ii) **Syndication** : During this stage, the technology/product is demonstrated and slowly commercialized.
- (iii) **Diffusion** : In this stage, the new technology slowly penetrates and replaces the old one.(E.g. Pentium chips have replaced 486 and the colour TV have phased out the Black & White T.V)
- (iv) **Substitution** : Substitution comes in when the cycle is complete and original technology is completely replaced by the advanced one (e.g the valve set radio no more exists.)



The typical life-cycle of a manufacturing process or production system from the stages of its initial conception to its culmination as either a technique or procedure of common practice or to its demise. The Y-axis of the diagram shows the business gain to the proprietor of the technology while the X-axis traces its lifetime.

**Answer 3. (c)**

Different techniques of improving productivity in industry are : (any 8 method is sufficient)

- (i) **Method Study** — It is the systematic recording and critical examination of existing and proposed ways of doing work, as means of developing and applying easier and more effective methods and reducing costs.
- (ii) **Motion and Time study** — In motion study the work is divided into fundamental motions and in time study work is divided into elements of operations. In both cases attempts are made to remove useless motions and improve combination and sequences of motions and operations.
- (iii) **Ergonomics (or Human Engineering)** — Ergonomics is the study of designing equipment and devices that fit the human body, its movements and its cognitive abilities.
- (iv) **Network Analysis** — PERT/CPM etc. for planning - These are planning and project management tools. They can help ensure a project is completed as quickly as possible, and resources used as efficiently as possible.
- (v) **Value Analysis** — Value Analysis is an effective tool for cost reduction and the results accomplished are far greater. It improves the effectiveness of work that has been conventionally performed as it questions and probes into the very purpose, design, method of manufacture, etc., of the product with a view to pinpointing unnecessary costs, obvious and hidden which can be eliminated without adversely affecting quality, efficiency, safety and other customer features.
- (vi) **Statistical Quality Control** — Statistical quality control refers to the use of statistical methods in the monitoring and maintaining of the quality of products and services.
- (vii) **Operations Research** — Operations research, is a discipline that deals with the application of advanced analytical methods to help make better decisions. Operational research (OR) encompasses a wide range of problem-solving techniques and methods applied in the pursuit of improved decision-making and efficiency, such as simulation, mathematical optimization, queueing theory and other stochastic-process models.
- (viii) **Inventory Control** — Inventory control is a set of policies and operating procedures that are designed to maximize a company's use of inventory, so that it generates the maximum profit from the least amount of inventory investment without intruding upon customer satisfaction levels.
- (ix) **Budgetary Control** — It is methodical control of an organization's operations through establishment of standards and targets regarding income and expenditure, and a continuous monitoring and adjustment of performance against them.
- (x) **Management by objectives** — Management by objectives (MBO) is a systematic and organized approach that allows management to focus on achievable goals and to attain the best possible results from available resources.

**Q. 4. (a)** Examine each statement and indicate whether it is 'True' or 'False'

[1×5]

- (i) Gantt chart is used for production control.
- (ii) Job enrichment means increased work load for the worker.



- (iii) Scheduling and Routing are both interconnected.
- (iv) Annealing involves heating and cooling operations.
- (v) In a Network Analysis, a job for which the slack time is zero is known as non-critical job.

**(b)** The following data are available for a manufacturing unit : [2×4]

No. of operators	15
Daily working hours	8
No. of days per month	25
Std. production per month	300 units
Std. Labour hours per unit	8

The following information was obtained for January 2012 :

Mandays lost due to absenteeism	30
Unit produced	240
Idle Time	276 man hours

You are required to calculate the following :

- (i) Percent absenteeism
- (ii) Efficiency of utilisation of labour
- (iii) Productive efficiency of labour
- (iv) Overall productivity of labour in terms of units produced per man per month.

**(c)** (i) Explain the need for acceptance sampling. [1]

(ii) The following costs have been recorded : [1×4]

Particulars	₹
Incoming materials inspection	10000
Training of personnel	30000
Warranty	45000
Process planning	15000
Scrap	9000
Quality laboratory	30000
Rework	25000
Allowances	10000
Complaints	14000

What are the costs of prevention, appraisal, external failure and internal failure?

**Answer 4. (a)**

- (i) **True.** A Gantt chart is a horizontal bar chart developed as a production control tool in 1917 by Henry L. Gantt, an American engineer and social scientist. Frequently used in project management, a Gantt chart provides a graphical illustration of a schedule that helps to plan, coordinate, and track specific tasks in a project.
- (ii) **False.** Job Enrichment is the process of making a job more interesting, challenging and satisfying for the employees. Job enrichment involves combining various existing and new tasks into one large module of work. The work is then handed over to an employee, which means there is an increase in responsibilities and scope.
- (iii) **True.** Scheduling is the process of deciding how to commit resources between a variety of possible tasks. Time can be specified or floating as part of a sequence of events. Routing is the process of selecting paths in a network along which to send network traffic. Routing is prerequisite for scheduling while time to be taken may form the basis of routing and that is fixed by scheduling.
- (iv) **True.** It is a heat treatment process that is usually applied to induce softening.
- (v) **False.** Slack time is zero for critical jobs.

**Answer 4. (b)**

No. of days, per month = 25

Daily working hrs. = 8

No. of operators = 15

No. of Man days = 15 × 25 = 375 Man days.

Total working hrs. = 375 × 8 = 3,000

Hours lost in absenteeism = 30 × 8 = 240

$$(i) \text{ Percent absenteeism} = \frac{240 \text{ hrs.} \times 100}{3000 \text{ hrs.}} = 8\%$$

(ii) Efficiency of utilisation of labour

$$\frac{\text{Standard labour hour to produce 240 units}}{\text{Total Labour hour}}$$

$$= \frac{240 \times 8 \times 100}{3000} = 64\%$$

(iii) Standard time required to produce 240 units = 240 × 8 = 1920 labour-hours.

In January, man hours lost = 30 × 8 = 240

" " idle time = 276

Total loss of time = 240 + 276 = 516 hours.

Productive hours available in January = 3000 hrs.

Less : Total loss of time = 516 hrs.

Actual labour-hours = 2484 hrs.

$$\text{Efficiency of labour} = \frac{\text{Std. Labour hrs.}}{\text{Actual Labour hrs.}} = \frac{1920 \times 100}{2484} = 77.3\%$$

- (iv) 15 men produce 300 units,  
 Std. labour productivity =  $300/15 = 20$  units.  
 In January, overall productivity =  $240/15 = 16$  units i.e. productivity falls by 20%.

**Answer 4. (c)**

- (i) Acceptance sampling is a technique which helps us to decide on the quality of incoming products and in deciding whether to accept or reject the lot, based on a test of samples. In absence of this technique, we would have to resort to 100% inspection of the lot. The 100% inspection alternative is however costly and time consuming, Also 100% inspection does not guarantee that the outgoing products are of good quality, because of monotony and possibility of human errors. Again 100% inspection cannot be used when ever the type of test for acceptance of the product is of destructive nature. Under these circumstances, we have to necessarily resort to acceptance sampling.

(ii)

Particulars	₹
Training of personnel	30,000
Process planning	15,000
<b>Total cost of prevention</b>	<b>45,000</b>
Incoming materials inspection	10,000
Quality laboratory	30,000
<b>Total cost of appraisal</b>	<b>40,000</b>
Scrap	9,000
Rework	25,000
<b>Total cost of internal failure</b>	<b>34,000</b>
Warranty	45,000
Allowances	10,000
Complaints	14,000
<b>Total cost of external failure</b>	<b>69,000</b>

**Section II : (Information Systems)**

Answer **Question No. 1**, which is compulsory and **any two** questions from the rest, under Section II.

**Q. 5. (a) Match the terms in Column I with the relevant terms in Column II :** [0.5×8]

Column I	Column II
(A) Baud Rate	(i) A program/utility under Windows
(B) FAQ	(ii) Term associated with magnetic tape
(C) Search Engine	(iii) Relating to official provider of information and files
(D) Flip-flop	(iv) A website enabling users to access various level of information
(E) Domain name	(v) Transmission speed of communication channel
(F) Icon	(vi) Bistable device
(G) Home Page	(vii) A list of common questions and sometimes with answers
(H) IBG	(viii) First hypertext document displayed

**(b) For each part below, choose the most appropriate answer out of the four options given against each part :** [1×3]

(i) A number system with a base 8 is known as :  
 (A) Binary; (B) Decimal; (C) Octal; (D) Hexadecimal.

(ii) A common coding language for the www is :  
 (A) HTML; (B) Front Page; (C) Netscape; (D) Listserver.

(iii) 'Firmware' is associated with :  
 (A) Application software for firms; (B) Special purpose hardware device;  
 (C) Benchmark software; (D) Software in ROM.

**(c) Put an appropriate word in blank position :** [1×4]

- (i) The purpose of \_\_\_\_\_ is to determine whether the developed or acquired software achieves its specified requirements.
- (ii) In \_\_\_\_\_ Network, terminals (end nodes) are connected to a central node or hub node.
- (iii) The basic aim of \_\_\_\_\_ in data structure is to eliminate redundancy and inconsistent dependency.
- (iv) In Control Unit of CPU, the summation of instruction time and execution time is called \_\_\_\_\_ time.

- (d)** Each statement below is either 'True' or 'False'. Indicate the same in your answers : [1×3]
- (i) An open system is a self-contained one and normally a rigid one.
  - (ii) Data mart is a complex form of data warehousing, costly and time consuming.
  - (iii) A record is identified by its key field.

**Answer 5. (a)**

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

**Answer 5. (b)**

- (i) — (C) Octal;
- (ii) — (A) HTML;
- (iii) — (D) Software in ROM.

**Answer 5. (c)**

- (i) Testing
- (ii) Star
- (iii) Normalisation
- (iv) Cycle

**Answer 5. (d)**

- (i) **False.** An open system is one which interacts with its environment and can change itself to accommodate the changes in factors like customers' preference, price, product design etc.
- (ii) **False.** Data mart is the simple form of data warehousing. In other words, it is a scaled-down version of data warehousing.
- (iii) **True.** This key field is used for searching a particular record for processing, display, editing etc.

**Q. 6. (a)** Briefly define Information System Infrastructure and its basic components. [1+3]

- (b)** A company is planning to procure hardware and asks you to advise on the options available before them for hardware procurement. Please list out the options and comparative advantages for each option. [2+4]

(c) In a Purchase Order Processing system, a purchase order record has the following fields : [6]

Field Name	Maximum Field Size
Purchase-order-number	6
Vendor Code	3
Order-quantity	5
Order-date	6

It is estimated that at any point of time, the outstanding Purchase Order file would have a maximum of 750 outstanding purchase order records in the file (once material is received, the purchase order record is purged from the file). However, there may be a 15% increase in the total number of records in near future. The file management software also requires an overhead of 20% for minimising probabilities of collision and overflow conditions. Compute the total file space requirements after allowing for 10% contingency factor on the total.

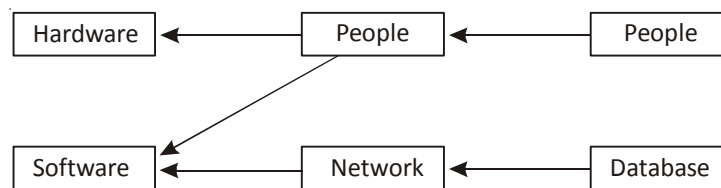
(d) In a disk pack, number of tracks in each surface are 200 and number of sectors in each track are 22. If there are 10 Nos. of recording surfaces and 500 bad sectors in the disk pack, calculate total number of good sectors. [2]

**Answer 6. (a)**

Information System Infrastructure mean the physical resources and organizational support required for operation of an information system.

It consists of following six basic components :

- Hardware - Devices which store software, database and process data
- Software - Programs which process data to generate reports
- Database - Data collected is stored in databases
- Network - Technology for sharing the data and other hardware resources
- People - Human resources to make the system operational.
- Reports - Reports are generated by the software with the help of databases for the use by users (people).



**Answer 6. (b)**

Hardware may be procured with the following options:

1. Outright Purchase
2. On Rent
3. On Lease
4. Hire Purchase

**Comparative advantages of each option :**

1. Outright Purchase option is generally practiced in India. The advantage in outright purchase is flexibility in the use of the machine according to the need of the organization. Moreover, tax benefit on depreciation is another point which encourages the users to go for outright purchase.
2. Hardware is procured on rent for the following advantages :
  - (i) Cash outlay for procurement is avoided.
  - (ii) Rent is allowable expenses for tax.
  - (iii) Risk of obsolescence is not with the user.
3. Procurement on Lease is opted in case machine is of high configuration and seller is generally the manufacturer.
  - (i) Cash outlay for procurement is avoided.
  - (ii) Lease charges is allowable expenses for tax.
  - (iii) Risk of obsolescence is with the lessor.
4. Hire Purchase option is normally not used as Computer becomes outdated very fast. This option is exercised only to avoid immediate investment for procurement.

**Answer 6. (c)****Calculation of Record Size :**

Field name	Maximum Field Size
Purchase-order-number	6
Vendor code	3
Order-quantity	5
Order-date	6
For record deletion Marker	1
Therefore, Record Size	<u>21</u>

**Calculation of File Space Requirement :**

Record Size	21
× Maximum expected records	750
= Required Record Space	<u>15750</u>
+ 15% increase in future (15% of 15750)	<u>2363</u>
	18113
+ 20% overhead (20% of 18113)	<u>3623</u>
	21736
+ 10% contingency (10% of 21736)	<u>2174</u>
Therefore, File Space Required	23910

**Note :** If record deletion marker is not added, the maximum field size will be 20 and answer will be 22770.

**Answer 6. (d)**

No. of tracks per surface = 200

No. of sectors per track = 22

No. of recording surfaces = 10

Therefore, total number of sectors =  $200 \times 22 \times 10 = 44,000$

No. of bad sectors = 500

Therefore, no. of good sectors =  $44000 - 500 = 43,500$

**Q. 7. (a)** A consumer desires to transact in Electronic Cash. What are the steps involved in transferring money between the parties? State the benefits of using Electronic Cash. [4+2]

**(b)** You as Finance Manager has received a proposal from your IT Department to enter into an annual maintenance contract for ERP software that has been implemented in the company. Considering the fact that ERP packages are proven software packages, why should the company enter into the contract? [4]

**(c)** Expand the following acronyms : [1×3]  
(i) FTP; (ii) TCP/IP; (iii) URL

**(d)** A manufacturing company is considering the implementation of an ERP system. The company has a few computerised applications running in different areas of the organisation. All these will be discontinued after ERP system is implemented. A software firm has given a quotation for the new system which states that the implementation will take a little more than a year and the capital cost will be ₹ 95 lakhs (payable as ₹ 75 lakhs in the first year and ₹ 20 lakhs in the second year). The following information about Operational Costs (₹ lakhs) are also available : [5]

	Year 1	Year 2	Year 3	Year 4	Year 5
Old system	30	33	38	42	49
New system	—	18	17	18	19

The management is wondering as to when the ERP system will recover all of its initial costs and start making a profit. What would be your answer based on the above data?

**Answer 7. (a)**

Electronic cash or e-Cash or Digital Money is to provide the means to transfer money between parties in the network.

**Steps involved in transferring money between parties are :**

- Consumer requests his bank to transfer money to e-mint to obtain electronic cash.
- Consumer bank transfers money from customer account to e-mint.
- E-mint sends the cash to consumer. Consumer sends the electronic cash in a hard drive or a small card.



- Consumer selects the goods and transfers the e-cash to merchant.
- The merchant provides the goods to the customer.
- The merchant sends the electronic cash to his bank.
- The bank redeems the money from the e-mint.
- E-mint transfers the money to the merchant's bank account.

**Benefits of using Electronic Cash are :**

- Potential fraud is reduced-when the bank receives the electronic cash, it verifies the serial number; it deletes the serial number and takes it out of circulation forever. The same number cannot be re-used.
- Preference of Merchant-Merchant will prefer electronic cash, since it guarantees the payment.
- Confidentiality of customer-Customer's confidential information regarding his Bank Account etc. is not disclosed.

**Answer 7. (b)**

All software irrespective of how well it has been designed and developed and irrespective of whether it is an ERP or any other packaged software requires maintenance over its life time. Maintenance of information systems means enhancement, modifications and corrections to the software. Once the implementation of ERP system is over, the services of vendor and the hired consultants will not be available. Trained in-house employees may have limited exposure to take care of all the problems just after implementation.

There are several reasons why all information systems need maintenance viz.

- New functionality may be added which will invite different technical problems like enhancement of system, fresh configuration for added integration features.
- To reap the full benefit of ERP system, there should be arrangement for continuous training of employees and periodical review on how to enhance the advantage from the system.
- There may be situations like changing business environment, changes in users' expectations, and changes in technology which are to be incorporated in the system.
- There may deterioration in software quality due to patches from time to time.
- Changes necessary for savings in time.

It is therefore necessary to enter into an annual maintenance contract with a specialized firm for ERP system, including training of in-house personnel.

**Answer 7. (c)**

- (i) **FTP** : File Transfer Protocol
- (ii) **TCP/IP** : Transmission Control Protocol/Internet Protocol
- (iii) **URL** : Uniform Resource Locator

**Answer 7. (d)****Calculation of Pay-back period for ERP System**

End of year	Operational Cost ₹ Lakhs		Difference (a) – (b) ₹ Lakhs	Cumulative Difference of Operational Cost ₹ Lakhs
	Old System ₹ Lakhs (a)	New System ₹ Lakhs (b)		
1	30	75	– 45	– 45
2	33	38	– 5	– 50
3	38	17	+ 21	– 29
4	42	18	+ 24	– 5
X				
5	49	19	+ 30	+ 25

Pay-back period lies between 4<sup>th</sup> and 5<sup>th</sup> year. Let 'X' be the pay-back period, where cumulative operational cost difference is 'Zero'.

By simple interpolation method, we get pay-back period as under :

$$\frac{X-4}{5-4} = \frac{0-(-5)}{25-(-5)} = \frac{5}{30} = \frac{1}{6}$$

$$\therefore X-4 = \frac{1}{6}$$

$$\therefore x = \frac{25}{6} = 4.1667 = 4 \text{ years 2 months (approx.) as pay-back period.}$$

Hence, the management will recover initial cost after 4 years 2 months and start making profit after that period.

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

[3×6]

- (a) Firewall;
- (b) Fibre optics;
- (c) Expert system;
- (d) CASE tools;
- (e) Peer-to-peer architecture;
- (f) Advantages of Flow charts;
- (g) Computer fraud;
- (h) Cryptography & Encryption.

**Answer 8. (a)**

**Firewall :**

Firewalls offer an effective system to protect access by unauthorized user from outside. The main feature of firewall is packet-filtering router so that vital information does not pass to any unauthorized intruder, even if he manages to get access to the network system. It is a system of security in the network with the help of hardware and software. Software checks all incoming and outgoing internet traffics. The firewall routes the messages to a safe area to avoid any danger in the forward transmission of messages. The screening by firewall software may delay the transmission process but ensures proper security.

Limitations of Firewall

- Passing on information by internal employees through internet cannot be checked
- Firewall cannot protect the system from virus.

**Answer 8. (b)**

**Fibre optics :**

Fibre-optic technology is used to transmit the signal using glass fibre. It radiates light rather than electricity. It is made of glass and plastic and the cladding part has a different refractive index from the core which minimizes the light loss through the sides of the cable and promotes internal reflections down the length of the core. It is very good transmission media in terms of speed and capacity and less hazardous. Fibre-optic cables has made great contribution in reduction of communication media in terms of size and weight but enhanced the speed of communication. A single glass fibre can carry more than 50,000 telephone calls simultaneously compared to 5,500 calls on a standard coaxial cable line. Speed of optical fibre in laboratory is six trillion bits per sec.

**Answer 8. (c)**

**Expert system :** According to CIMA, an Expert System is an application software system which is used to store data relevant to a particular subject area and to provide solutions to problems requiring discriminatory judgement based on that data.

Expert system is software which derives extraordinary intelligent solution like an expert. The knowledge of an expert is invaded in the software with solution options for different complex problems situation, particularly, unstructured problem situation. Here the expert knowledge is knowledge of specialized field and solutions sets at different problem situations.

For example, knowledge of expert marketing management for experts system in marketing, knowledge of legal expert for expert system in legal field, expert knowledge of taxation for expert system in taxation.

This expert knowledge and history of different unstructured problem solutions are stored in organized manner so that the related expert system can use the data base. The expert system is not a simple management information system. Rather it helps in involving solutions in complex problem situation. The component in expert systems are :

- Data management
- Expert knowledge handling tools
- Complex problem situations and framing corresponding solutions sets.

**Answer 8. (d)**

**CASE tools** : CASE stands for Computer Aided Software Engineering. CASE tools are used for having automatic designing assistance with the help of versatile system designing facilities available in them. They are used in the following activities :

- Drawing flow diagram
- Designing file structure
- Defining Data Dictionary
- Drawing forms
- Generating Report formats etc.

**Answer 8. (e)**

**Peer-to-peer architecture** : Under this type of architecture, each workstation has equivalent capabilities and responsibilities. There is no computer at the centre connecting others through it. It is simpler and less expensive, but under heavy load condition, their performance is good. Individual resources such as disk drives, CD-ROM drives, printers etc. Become shared resources which can be accessed by any node. The benefits of peer-to-peer architecture are :

- No Network Administrator is needed
- Network is simple and easy to maintain
- Each computer can provide backup copies of its files to others for security.
- Cost of network is low.

**Answer 8. (f)**

**Advantages of Flow Charts** : Flow Chart is the diagrammatic representation of the algorithm i.e. program logic. It uses a unique set of symbols to describe the conditions and actions.

Advantages of Flow Charts are :

- Logical representation of problem steps
- Help to make the complex logic simpler
- A visual aid in conceptualization of the problem
- A tool for efficient programming
- Helps in debugging
- Support program documentation

**Answer 8. (g)**

**Computer fraud** : Computer fraud is an illegal action with the help of computer technology to make financial gain, to have unauthorized access to private information of others, to damage software/data etc. The computer frauds have become a very sensible issue because of the following situation :

- Wide interconnectivity among the machines through network thereby making information system more vulnerable

- Internet and e-commerce have increased the risk of hacking.
- Growth of e-cash transactions will induce more frequent attempt for interception.
- Common tendency for piracy of software.
- Strategic damage out of unauthorized access by competitor/enemy to confidential information.

**Some common techniques of computer fraud are :** Hacking, Cracker, Password cracking, Software piracy, Virus, Trap door, Super-zapping etc.

Measures for detection/prevention of damage out of fraud are :

- Proper security measures and use of expert software to provide advance alert signal etc.
- Proper audit at regular intervals on control measure.
- Disk imaging.
- Keeping regular backup of important files/databases.
- Train employees in measures against fraud prevention.
- Identify and manage disgruntled employees.
- Punishment to unethical activities.
- Use of only licensed version of software etc.

**Answer 8. (h)**

**Cryptography & Encryption :** Cryptography is a technique to encrypt and decrypt messages for maintaining confidentiality in the information between sender and receiver.

Encryption is a process of converting a text into a scrambled form by the use of some mathematical function. Decryption is the reverse process to convert the scrambled form of text into readable text. Generally, there are two functions-one is used for encryption and the other one is for decryption.