Paper 9 - Operations Management and Information Systems

Section –A

[Question 1 is compulsory and ay 4 from the rest]

1. Answer any 6 questions of the following:

(a) The demand for sewing machine was estimated as 1000 per month for 5 months. Later on the actual demand was found as 900, 1050, 1100 and 950, respectively. Calculate the MAD and Bias.

(b) Discuss the Input/ Output Control.

(c) Define Quality Function and Development (QFD)

(d) A work study practitioner who conducted a work sampling study assesses the activity level of worker to be 70%. During the space of 8 hours working, this worker turns out 320 components. If the company policy is to inflate the normal time arrived at by work sampling study by 20% , what should be the allowed time per unit ?

(e) State the applications of Programme Evaluation and Review Technique (PERT)

(f) Discuss about the Total Float.

(g) Monthly demand for a component 1,000 units. Setting –up cost per batch ₹ 120. Cost of manufacture per unit ₹ 20. Rate of interest 10% P.a. Calculate the EBQ. Mentioning the Five principles of TQM. **[6x2=12]**

Answer of 1:

(a) $$MAD = \frac{|1000-900| + |1000-1050| + |1000-1000| + |1000-1100| + |1000-950|}{5}$$

$$= \frac{100+50+0+100+50}{5}$$

$$= 60 \text{ units of sewingmachines}$$

$$\text{Bias} = \frac{(1000-900) + (1000-1050) + (1000-1000) + (1000-1100) + (1000-950)}{5}$$

$$= \frac{100-50+0-100+50}{5}$$

$$= 0 \text{ units of sewing machines}$$

(b) Input /Output Control

It is a control technique where the planned and actual inputs are monitored. Actual input is compared to planned inputs to identify where work center output might vary from the plan because work is not available at the work center. Actual output is also compared to the planned output to identify problems within the work center. Planned and actual inputs as well as outputs have an impact on the Work-in-Process (WIP) inventory.

(c) Quality, Function and Development

QFD is a systematic and organized approach of taking customer needs and demands into consideration when designing new product and services or when improving existing products and services. Another name for this approach is "customer-driven engineering" because the voice of the customer is diffused throughout the product (or service) development life cycle.

(d) Activity level as per work sampling study = 70%

Actual working time per shift of 8 hours = $8 \times \frac{70}{100} = 5.6$ hours

Normal time taken per unit = $\frac{5.6 \times 60}{320} = 1.05$ minutes

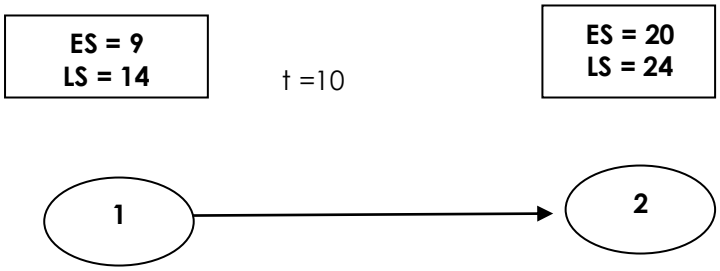
Allowed time = $1.05 \times \frac{120}{100} = 1.26$ minutes

(e) PERT is useful in the following situations:

- The project should have identifiable activities.
- The activities should have clear starting and ending points.
- Project is complicated and consists of many inter-related tasks.
- Technique is good for projects, where alternative options, sequence of activities and time period are involved.

(f) Amount of time by which the completion of an activity could be delayed beyond the earliest completion time without affecting the overall project duration time. It is measured by the maximum time of the difference between maximum time available to perform activity and activity duration time or the difference between latest start time and earliest start time.

TS (a) = LS (a) – ES (a)



For Activity 1-2, ES = 9 and LS = 14
Then Total Float for (1-2) = 14-9 =5

(g) Calculation of EBQ:

EBQ= $\sqrt{\frac{2DS}{C}}$

D= Annual demand = 12 x 1,000
S= Setting up cost per batch = ₹ 120
C= Carrying Cost per unit of Production = ₹ 20

EBQ = $\sqrt{\frac{2 \times 12 \times 1{,}000 \times 120}{0.1 \times 20}}$ = 1,200 units.

(h) The Five Principle of Total Quality Management (TQM):

(i) Concentrate on the customer
(ii) Do it right first time
(iii) Communication and educate
(iv) Measure and record
(v) Do it together

2. (a) The output of a production line is checked by an inspector for one or more of three different types of defects, called defect A, B and C. If defect A occurs, the item is scrapped. If defect B or C occurs, the item must be reworked. The time required to rework of B defect is 15 minutes and the time required to rework of C defect is 30 minutes. The probabilities of an A, B and C defects are 0.15, 0.20 and 0.10 respectively. For ten items coming of the assembly line,
Determine the number of items without any defects, the number scrapped and the total minutes of rework time. Use the following random numbers:

RN for defect A	**48**	**55**	**91**	**40**	**93**	**01**	**83**	**63**	**47**	**52**
RN for defect B	**47**	**36**	**57**	**04**	**79**	**55**	**10**	**13**	**57**	**09**
RN for defect C	**82**	**96**	**18**	**96**	**20**	**84**	**56**	**11**	**52**	**03**

(b) Discuss the objectives of the Material Requirement Planning.

(c) State the Cycle Time in the Line Balancing. **[6+4+2]**

Answer of 2:

(a) Range of random numbers according to the probabilities of defects of three types A, B and C can be summarized as follows:

Defect A		**Defect B**		**Defect C**	
R. No. Range	**Yes / No**	**R. No. Range**	**Yes / No**	**R. No. Range**	**Yes / No**
00 – 14	Yes	00 – 19	Yes	00 – 09	Yes
15 - 99	No	20 – 99	No	10 - 99	No

The number of ten items coming off the assembly line without any defect and also the total time for rework is obtained in the following table:

Item No.	**R. No. (A)**	**R. No. (B)**	**R. No. (C)**	**Defects**	**Rework Time Minutes**	**Remarks**
1	48	47	82	None	-	-
2	55	36	96	None	-	-
3	91	57	18	None	-	-
4	40	04	96	B	15	-
5	93	79	20	None	-	-
6	01	55	84	A	-	Scrap
7	83	10	56	B	15	-
8	63	13	11	B	15	-
9	47	57	52	None	-	-
10	52	09	03	B, C	(15+30)=45	-

From the above, it is observed that during the stimulated period, 5 out of 10 items had no defects. One item was scrapped and 90 minutes of total rework time was required by 3 items.

(b) MRP is a technique of working backward from the scheduled quantities and needs dates for end items specified in a master production schedule to determine the requirements for components needed to meet the master production schedule. The technique

determines what components are needed, how many are needed, when they are needed and when they should be ordered so that they are likely to be available as needed.

Objectives of MRP :

(i) **Inventory Reduction:** MRP determines how many components are required, when they are required in order to meet the master schedule. It helps to procure the materials/components as and when needed and thus avoid excessive build up of inventory.

(ii) **Reduction in the Manufacturing and Delivery Lead Times:** MRP identifies materials and component quantities, timings when they are needed, availabilities and procurements and actions required to meet delivery deadlines. MRP helps to avoid delays in production and priorities production activities by putting due dates on customer job orders.

(iii) **Realistic Delivery Commitments:** By using MRP, production can give marketing timely information about likely delivery times to prospective customers.

(iv) **Increased Efficiency:** MRP provides a close coordination among various work centers and hence helps to achieve uninterrupted flow of materials through the production line. This increases the efficiency of production system.

(c) Line balancing is arranging a production line so that there is an even flow of production from one work station to the next, i.e. so that there are no delays at any work station that will leave the next work station with idle time.

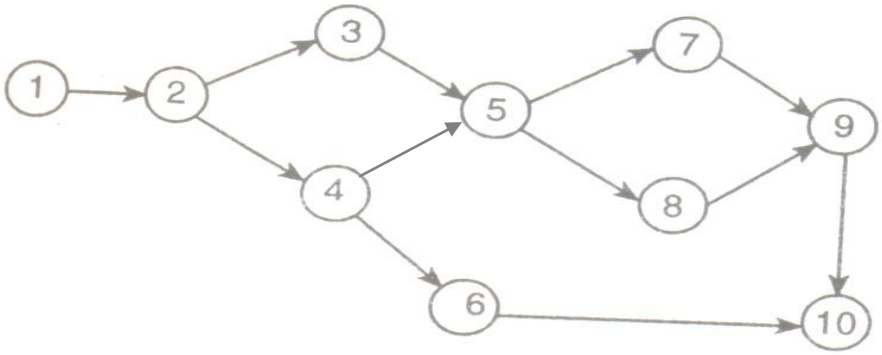
The key to efficient line balancing is to group activities or tasks in such a way that the work times at the work station are at or slightly less than the cycle time or a multiple of cycle time if more than one worker is required in any workstation.

Determination of cycle time (CT) : When the amount of output units required per period (period may be hour, shift, day or week etc.) is specified and the available time per period is given (i.e., the number of working hours per shift, number of shifts per day, number of working days per week etc.) then,

$$\text{Cycle time (CT)} = \frac{\text{Available time per Period}}{\text{Out units required per period}}$$

Cycle time is the time interval at which completed products leave the production line.

3. (a) Various activities of small project and other relevant information have been shown in the adjoining table:



Activity	Most optimistic time (in days) (a)	Most likely time (in days) (m)	Most pessimistic time (in days). (b)
1 – 2	4	8	12
2 – 3	1	4	7

2 - 4	**8**	**12**	**16**
3 – 5	**3**	**5**	**7**
4 - 5	**0**	**0**	**0**
4 – 6	**3**	**6**	**9**
5 – 7	**3**	**6**	**9**
5 - 8	**4**	**6**	**8**
7 – 9	**4**	**8**	**12**
8 – 9	**2**	**5**	**8**
9 – 10	**4**	**10**	**16**
6 – 10	**4**	**6**	**8**

Using the given information, and the resulting network shown in the above Fig:
Determine the following:

(i) Expected task times and their variance.
(ii) The critical path.
(iii) Variance of Critical Path.

(b) Explain the Prohibited Route. **[10+2]**

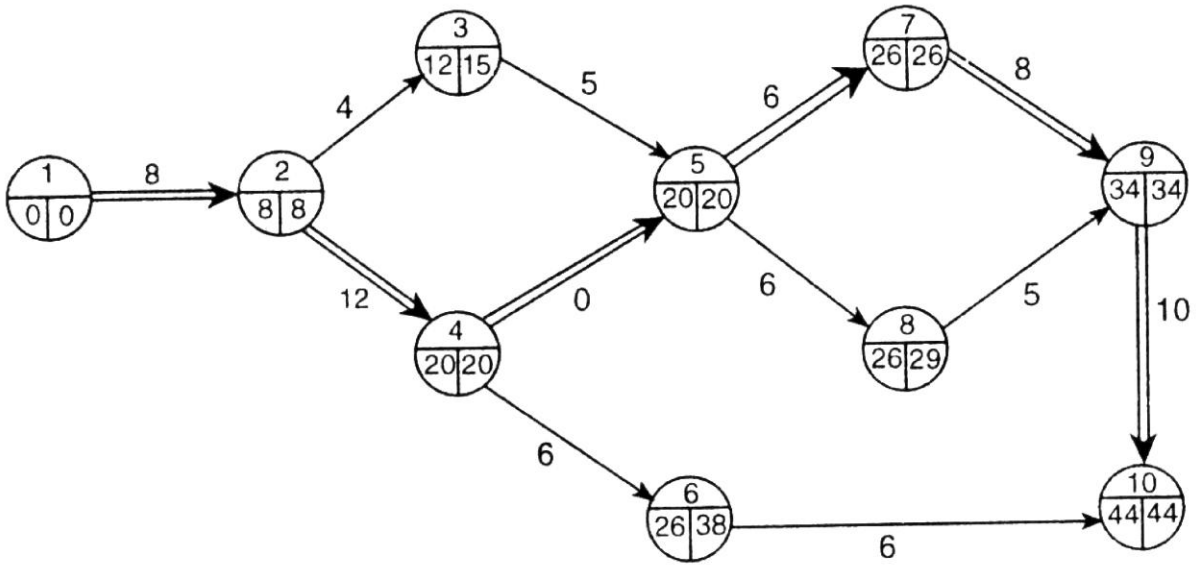
Answer of 3:

(i) The expected time t_e (or μ) and the variance (σ_t^2) for each activity of the project is computed and shown in the following table:

Computation of Expected Times and Variances

Activity	**Most optimistic time (in days) (a)**	**Most likely time (in days) (m)**	**Most pessimistic time (in days). (b)**	**Expected time** $t = \frac{a+4m+b}{6}$	**Variance** $\sigma^2 = [\frac{1}{6}(b-a)]^2$
1 – 2	4	8	12	8	1.78
2 – 3	1	4	7	4	1
2 – 4	8	12	16	12	1.78
3 – 5	3	5	7	5	0.44
4 – 5	0	0	0	0	0
4 – 6	3	6	9	6	1
5 – 7	3	6	9	6	1
5 – 8	4	6	8	6	0.44
7 – 9	4	8	12	8	1.78
8 – 9	2	5	8	5	1
9 – 10	4	10	16	10	4
6 - 10	4	6	8	6	0.44

(ii) For calculation of critical path, we draw the Network Diagram:



It may be observed from above Fig. that critical path of project is 1 – 2 – 4 – 5 – 7 – 9 – 10.

The expected project length is the sum of the duration of each critical activity, i.e., Expected project length,

$$T_e = 8 + 12 + 0 + 6 + 10 = 44 \text{ days}$$

(iii) The variance of critical path is the sum of the variances of each critical path
Variance of Critical Path (Vcp) = $\sum v = 1.78 + 1.78 + 0 + 1 + 1.78 + 4 = 10.34$

(b) Prohibited Routes

Sometimes in a given transportation problem some route(s) may not be available. This could be due to a variety of reasons like the unfavourable weather conditions on a particular route, strike on a particular route etc. In such situations, there is a restriction on the routes available for transportation. To handle a situation of this type, we assign a very large cost represented by M to each of such routes which are not available. Then the problem is solved in the usual way. The effect of adding a large cost element would be that such routes would automatically be eliminated in the final solution.

4. (a) A firm owns facilities at six places. It has manufacturing plants at places A, B and C with daily production of 50, 40, and 60 units respectively. At point D, E, and F it has three warehouses with daily demands of 20, 95, and 35 units respectively. Per unit shipping costs are given in the following table. If the firm wants to minimize its total transportation cost, how should it route its products by using its LCM?

		Warehouse		
		D	**E**	**F**
Plant	**A**	**6**	**4**	**1**
	B	**3**	**8**	**7**
	C	**4**	**4**	**2**

(b) "A flexible manufacturing system (FMS) is a configuration of a group of production machines (or workstations) connected by automated material handling and transferring machines and integrated by computer system which can give instructions to produce

hundreds of different parts in whatever order specified." – Explain the statement with the reference of components, advantages and disadvantages of that system. [7+5]

Answer of 4:
(a)

To → / From ↓	D	E	F	Supply
A	6	4 [15]	1 [35]	~~50~~ 15
B	3 [20]	8 [20]	7	~~40~~ 20
C	4	4 [60]	2	60
Demand	20	95	35	150

Step 1: Here the lowest cost is 1 which appears in cell (A, F). We assign the demand 35 units and leave the supply 15 units. Consequently, we crossed the last column.

Step 2: After that the lowest cost is 3 which appears in cell (B, D). We assign the demand 20 units and leave the supply 20 units. We crossed the First column.

Step 3: The smallest element of the remaining matrix is 4 which appears in cell (C, E). We assign the 60 units demand and exhaust the all supply and crossed the last row.

Step 4: The remaining the 20 units are assign in cell (B, E).

The total cost associated with the solution is:
3x20+4x15+8x20+4x60+1x35=(60+60+160+240+35) = 870

(b) Flexible Manufacturing System (FMS):
A flexible manufacturing system (FMS) is a configuration of a group of production machines (or workstations) connected by automated material handling and transferring machines and integrated by computer system which can give instructions to produce hundreds of different parts in whatever order specified.

An FMS is a type of flexible automation system which builds on the programmable automation of NC and CNC machines. Materials are automatically handled and loaded and unloaded for machining operations. Programs and tooling set up can be quickly changed and production can be quickly switched on from one job to another with no loss of change over- time.

Key components of an FMS are:

(a) Several computers controlled machining centers or workstations having CNC machines and robots for loading and unloading.
(b) Computer controlled transport system (AGVs) for moving materials and parts from one machine to another and in and out of the system.
(c) Computer controlled robots for loading and unloading stations.
(d) An automated storing and retrieval system.

All the above subsystems of FMS are controlled by a central computer with the needed software. Raw materials are loaded on the AGVs which bring them to the work centres as

per the sequence of operations unique to each part. The route is determined by the central computer. The robots lift the materials from the AGV and place on the workstation, where the required operations are carried out. After the completion of operations, the robots unload the job and place it on the AGV to move the job to the next workstation as per the sequence of operations.
The FMS is suitable for intermediate flow strategies with medium level of product varieties and volumes (40 to 2000 units per part). Also, FMS can produce low variety high volume products in the same way as fixed automation systems.

Advantages: (a) Improved capital utilization, (b) Lower direct labour cost, (c) Reduced inventory, (d) Consistent quality, (e) Improved productivity.

Disadvantage: (a) High initial capital investment, (b) Limited ability to adopt to product changes, (c) Substantial preplanning, tooling and fixture requirements, (d) Standardization of part designs needed to reduce number of tools required, (v) Requires long planning and development cycle to install FMS.

5. (a) The demand curve faced by a firm is p = 20 - 4x and the cost function is C = 4x (where p= price, x = output, and C = total cost).

(i) Determine the optimum level of output, price and maximum profit if the objective of the firm is to maximize profit.

(ii) What will be the new price if a unit tax of ₹ 0.50 is imposed?

(iii) Determine the rate of unit tax so that tax revenue is maximum.

(b) The demand function for neckties is given as $q = 100 - \frac{1}{3}p$. Calculate the elasticity of demand (e_d) at a price of 240.

[10+2]

Solution of 5:

(a)

(i) Suppose R = Total revenue and π = total profit.

Then R = px = (20 – 4x) x = $20x – 4x^2$

$\therefore \pi$ = R – C = $20x – 4x^2 – 4x = 16x – 4x^2$

To maximize π, the fist order condition requires, $\frac{d\pi}{dx} = 0$.

So, $\frac{d\pi}{dx} = 16 – 8x = 0$

or, 8x = 16

or, x = $\frac{16}{8} = 2$.

The second order condition requires that $\frac{d^2\pi}{dx^2} < 0$. Here,

$\frac{d^2\pi}{dx^2} = -8 < 0$. So the second order condition is fulfilled.

So, x = 2. Then p = 20 – 4 x 2 = 20 - 8 = 12

The amount of maximum profit $\pi = 16(2) – 4(2)^2 = 32 – 16 = 16$.

(ii) When tax per unit is ₹ 0.50, net profit (N) = $20x – 4x^2 – 4x – 0.5x$

or, N = $15.5x - 4x^2$

To maximize N, the first order condition requires $\frac{dN}{dx} = 0$

or, 15.5 – 8x = 0

or, 8x = 15.5

$\therefore x = \frac{15.5}{8} = 1.9375$

Here $\frac{d^2N}{dx^2} = -8 < 0$. So the second order condition is fulfilled. $\therefore x = 1.9375$.

When x = 1.9375, p = 20 – 4(1.9375) = 20 – 7.75 = 12.25.

(iii) Let the tax per unit be t.

Then, net profit $N = 20x - 4x^2 - 4x - tx = 16x - 4x^2 - tx$

To maximize N, $\frac{dN}{dx} = 0$ and $\frac{d^2N}{dx^2} < 0$

Now, $\frac{dN}{dx} = 16 - 8x - t = 0$

Or, 8x = 16 – t

$\therefore x = \frac{16-t}{8} = 2 - \frac{t}{8}$

$\frac{d^2N}{dx^2} = -8 < 0$ i.e., the second order condition is fulfilled.

$\therefore x = 2 - \frac{t}{8}$. Now, total revenue $T = tx = t(2 - \frac{t}{8}) = 2t - \frac{t^2}{8}$

To maximize T, the first order condition requires

$\frac{dT}{dt} = 0 \text{ and } \frac{d^2T}{dt^2} < 0$

Now, $\frac{dT}{dt} = 2 - \frac{t^2}{8} = 0$

Or, $\frac{t}{4} = 2$

$\therefore t = 8$

Again $\frac{d^2T}{dt^2} = -\frac{2}{8} < 0$. So the second condition is fulfilled. Hence tax revenue will be maximum if t = 8.

(b) At p =240, then $q = 100 - \frac{1}{3}(240) = 20$

Now, $\frac{dq}{dp} = -\frac{1}{3}$. We know $e_d = \frac{dq}{dp}.\frac{p}{q} = -\frac{1}{3}.\frac{240}{20} = -4$

(as at p =240 ,q =20)

$|e_d| = 4$

6. (a) The Mini Transport Company owns three mini buses, two of which are two years old while the third one is only a year old. Each of these buses was purchased for ₹ 80,000. The company contemplates replacing the three buses by two full-sized buses, each

such bus containing 50% more seating capacity than a mini bus. Cost of each is ₹ 1,20,000. Using the following data on the running costs and the resale value of both the types of buses, state whether the mini buses be replaced by the full-sized buses. If not, state why? If yes, state when?

Year	For a Mini Bus		For a Full – sized Bus	
	Running Cost	Resale Value	Running Cost	Resale Value
1	3,000	70,000	3,400	1,00,000
2	3,600	61,000	3,900	92,000
3	4,800	55,000	4,700	86,000
4	5,000	49,000	5,800	81,000
5	8,000	32,000	7,200	76,000
6	11,200	20,000	9,000	66,000
7	15,000	10,000	12,000	54,000
8	20,000	5,000	16,000	40,000

(b) Discuss the benefits of Material Planning. [10+2]

Answer of 6:

(a) We shall first calculate the minimum average cost for each type of the buses. This is given in Tables below.

For Mini Buses

Determination of Average Cost

Year	M_t (1)	Cum M_t (2)	C-S (3)	T(n) (4= 1+3)	A(n) (5= 4/year)
1	3,000	3,000	10,000	13,000	13,000
2	3,600	6,600	19,000	25,600	12,800
3	4,800	11,400	25,000	36,400	12,133
4	5,000	16,400	31,000	47,400	11,850
5	8,000	24,400	48,000	72,400	14,480
6	11,200	35,600	60,000	95,600	15,933
7	15,000	50,600	70,000	1,20,600	17,229
8	20,000	70,600	75,000	1,45,600	18,200

Where M_t = Running cost, c = cost, s= sales, T(n)= Total cost and A(n) = Average cost

For Full Sized Bus

Determination of Average Cost

Year	M_t (1)	Cum M_t (2)	C-S(3)	T(n) (4=1+3)	A(n) (5= 4/year)
1	3,400	3,400	20,000	23,400	23,400
2	3,900	7,300	28,000	35,300	17,650
3	4,700	12,000	34,000	46,000	15,333
4	5,800	17,800	39,000	56,800	14,200
5	7,200	25,000	44,000	69,000	13,800
6	9,000	34,000	54,000	88,000	14,667
7	12,000	46,000	66,000	1,12,000	16,000
8	16,000	62,000	80,000	1,42,000	17,750

Where M_t = Running cost, c = cost, s= sales, T(n)= Total cost and A(n) = Average cost

Thus, the minimum average cost for a mini bus is ₹ 11,850 p.a. and ₹ 13,800 p.a. for a full-sized bus. However, these two should not be compared directly because three mini buses are equivalent to two full-sized buses. Thus,

Average cost for all 3 mini buses = 11,850 x 3 = 35,550
Average cost for 2 large buses = 13,800 x 2 = 27,600.
Clearly, then, it is prudent to replace the mini buses by the full-sized buses.

To decide the timing at which the replacement be done, we shall first find the total yearly costs for the new buses. The year in which the average cost of the new buses shall be lower than the total cost of maintaining and running the old ones shall be the year when the replacement should be done. The calculations are given in Table below.

Determination of Yearly Cost of a Mini Bus

Year	Running Cost	Depreciation	Total Cost
1	3,000	10,000	13,000
2	3,600	9,000	12,600
3	4,800	6,000	10,800
4	5,000	6,000	11,000
5	8,000	17,000	25,000
6	11,200	12,000	23,200
7	15,000	10,000	25,000
8	20,000	5,000	25,000

For calculation of depreciation:
1st year = 80,000/8= 10,000 , 2nd year to end = Previous year resale value – current year resale value.
Total cost for next year would be: 2 x 10,800 + 12,600 = ₹ 34,200 (since two of the buses would be running in the third year and the third one in the second year). Total cost for the subsequent years shall be:

2 x 11000 + 10800 = ₹ 32,800
2 x 25000+ 11000 = ₹ 61,000 etc.

Since the total average cost of running the two buses is ₹ 27,600 whereas in the years to come the cost of owning and running the old buses would be greater than this, the conclusion is that the buses should be replaced immediately.

(b) Benefits of Materials Planning

(i) Materials planning both quantity and value in terms of rupees - for each item and overall, tries to avoid the practice of crisis management of struggling in the last minute to procure materials to meet the production requirements or pressurizing unnecessarily the purchase people by sitting on their neck to get the materials in the last moment.
(ii) It helps to get things done efficiently and effectively by better forecasting of future material needs and working pro-actively rather than reacting to the situations.
(iii) A well-designed materials planning system provides steps for effective materials budgeting, follow-up of suppliers to procure materials in-time, thereby avoiding material shortages and its undesirable effects on production.
(iv) Purchase planning which is based on materials planning, if carried out properly, will enable the buyer to know not only the prices of the materials but also their costs.

Section B

Question no. 7 is compulsory and answer any four from the rest

7. Answer the following **[4 x 2 = 8]**

(a) What do you understand by Business Process Reengineering (BPR)?

Answer:

BPR aim at to achieve dramatic improvement by major transformation of business processes. Merely putting in place an information system is not enough. Every company that intends to implement ERP has to reengineer its process in one form or the other. This process is known as Business process reengineering.

(b) Write short notes on "Executive Information System" (EIS).

Answer:

An Executive Information System (EIS) is a special type Management Information System meant for top management of an organization. In other words, it is a Decision Support System (DSS) for Executives. It aims at providing information to top executives of an organization who are involved in strategic decision making.

(c) Explain the importance of data dictionary in software development process.

Answer:

A data dictionary is very important in software development process because of following reasons.

i. It help programmers and system analyst for study, correction and enhancement of database or computer program that accesses these data.
ii. It help in establishing data integrity, file security etc.
iii. Accountants and auditor can make good use of data dictionary to find out programs permitted for modification of data items, user permitted for accessing data items etc.

(d) Distinguish between Logical Design and Physical Design.

Answer:

Difference between Logical Design and Physical Design

Logical Design	Physical Design
Logical Design related with flow of data or process	Physical design is related with describing the arrangement of various components like Inputs, Outputs and storage etc.
Logical design is mainly used for detailing process or procedure like detailing customer order processing with all validations.	Physical design is concerned with what all components will be used in application like in order processing what types of inputs, files, outputs devices and storage devises will be used and how these will be arranged.
Logical design are described with the help of program flowchart, decision tables etc.	Physical Design are described with the help of System Flowchart etc.

8. What are the activities involved in System Development phase? [8]

Answer:

Mainly The following activities are carried out for System Analysis phase:

A. Collection of information
B. Analysis of current system
C. Analysis of proposed system
D. Preparing the management report.

A. Collection of Information: Analyst extensively interact with people and collect data for the system to be developed. Information is gathered through various means like:

(i) Collecting Documents (ii) Questionnaires

(iii)Interviews (iv) Observations

The above techniques are also known as Fact finding Techniques

(i) Collecting Documents: In this analyst collect all the documents used by users for the existing system like Input forms (Vouchers), output forms (Reports), procedure manual etc to thoroughly understand the existing system working.
(ii) Questionnaires: In this Users and Managers etc are asked various questions regarding the problems with existing system and requirement from new system etc. The questionnaires help in collecting large data on problems with existing system and requirement from new system.
(iii) Interviews: Users and managers are interviewed to collect the information in depth and in exact form. The data gathered during interviews provide and analyst with clear picture of problems with existing system and requirements from new system.
(iv) Observations: Observation play a very important role in analysis of system. In this analyst personally visit the place of work of users and observe their working. This process provide the picture of user's working environment which in turn help analyst to design and develop a system which can satisfy the users needs in more appropriate manners.

B. Analysis of the Current System:
This step helps in analyzing the user's present system which in turn help in analyzing the user requirement from the proposed system.

Once analyst collect all the data regarding existing system and requirement from proposed system he first of all analyze the existing system by making various process diagram of existing system from the data collected and analyze this existing system for problems and inconsistencies which can be removed from the proposed system to provide a better and efficient new system.

This analysis covers the following areas:
(i) History of the organization: How organization has grown over the years, what type of system changes has taken place from time to time in organization and how adaptable is organization is for changes etc.
(ii) Inputs: In this analyst analyze the various inputs of organization in terms of their

content, format, preparation and how they are captured and entered for processing etc.

(iii) Data files maintained: In this analyst analyze the data files maintained by organization for various jobs in terms of their method of preparation, place, access, size and frequency of access etc. This step help analyst to design the efficient database for proposed system.

(iv) Methods, procedures and data communications: Method and Procedure are the business logics which transform inputs into outputs. This is a very crucial analysis, which provides the understanding of functional aspects of various business processes. To develop a correct and error free system a correct understanding of method and procedure of various functional aspects is very important.

(v) Outputs: This analysis of existing system provide analyst a picture about type of outputs generated and how they meet the organization needs. From this analysis analyst understand what types of information are needed and why, who needs information and when.

(vi) Internal controls: This analysis provides the details of existing controls implemented and their importance. The analysis of existing system controls help analyst to locate the weaknesses in the controls and same can be removed from proposed system.

After analyzing the existing system in terms of inputs, methods, procedures, data files, data communications, outputs, internal controls and other important items, all these items should be properly documented.

This involves the following steps.

a. Modeling Existing Logical and Physical System: This is done with the help of System Flow charts and Data Flow Diagrams. These models help to present the complete descriptions of existing system in terms of data flows, processes and outputs. These steps provide a blue print of existing system.

b. Undertake overall analysis of present system: On this basis of models prepared for existing system the analyst undertake the overall analysis of existing system in terms of

(i) Present work load
(ii) Various processes and personnel involved etc.
(iii) The present benefits, problems and cost etc.

C. System Analysis of Proposed System;

After the analysis of present system, to proposed system analysis and specifications starts. The proposed system analysis is done, using the data collected in collection of data step and models prepared during analysis of existing system.

The requirements specified from the proposed system by users and the shortcoming of present system are used to prepare the specification for proposed system in terms of

(i) outputs required from proposed system
(ii) database to be maintained with desired capabilities like on line working etc

(iii) inputs types, preparation, capturing and place of capturing for efficient data entry,

(iv) methods and procedures followed for relationships between inputs and output to database, data communication etc.

(v) Work load and timing etc for efficient working of proposed system

These specifications are defined on the basis of objective or scope of work defined in the preliminary investigation. The starting point of analyses of proposed system is outputs required because once the outputs required from proposed system is clearly defined, it is possible to specify the inputs, processes, database, communication system etc to produced the required outputs.

D. Preparing the Management Report: After completing steps mentioned above, all information gathered and analysis done there on is documented (known as System Requirement and Specification (SRS) document) and submitted to a management for approval and approved document become the contract or reference document for further development.

9. (a) What are the reasons of failure to achieve system Development Objectives? [4]

Answer:

There are many reasons due to which organization fail to achieve the System Development Objectives

(i) Changing User Needs: When user fail to specify exact requirement from the system and his need constantly changes, it become very difficult to develop a system successfully.

(ii) Lack of Senior Management support and involvement: When senior management does not support the system development and are not actively involved in development process, it also become a reason for non successful system because System Development is an expense (Ref: Expenses / Income activities) activity therefore, for a successful system development it is essential that there should be top management support for this.

(iii) Difficult to define the exact requirements particularly for unstructured or strategic system: It is difficult to define requirement from unstructured system, therefore, it become difficult to develop such kind of system.

(iv) Lack of standard project management and system development methodologies: Organization does not follow standard and tested project management and system development methodologies, therefore it become difficult to complete the system within stipulated time and budget.

(v) Lack of user participation: It is user, who ultimately will be owner of the system, therefore, user must participate to specify the exact requirement, resolve development problems and other issues related to system development for successful system.

(vi) Resistance to change: Information System often result in efficient working culture and some time also result in workforce cutting, these changes in organization environment often create a resistance from workforce for development of Information System

(vii) Over worked or under trained Development Staff: Information System development require the development staff updated with latest development tools and techniques, some time lack of education and training on part of developer also cause development of spurious or erroneous system which ultimately make a system failure.

(viii) Inadequate Testing and User Training: For a successful and error free system the system must be tested thoroughly and user should be provided adequate training for efficient use of system.

(ix) New Technologies: Some time use of new technologies by organization to attain competitive advantages becomes difficult to use, due to lack of skilled manpower and cost etc.

(b) Explain the methodology of System Development. [4]

Answer:

Methodology of System Development:

Methodology means methods followed, here system development methodology means methods followed for system development.

A system development methodology (also known as System Development Life Cycle (SDLC) methodology) is formalized, standardized well documented set of activities used to manage a system development project. This should be used when information system is developed or maintained.

The methodology has the following characteristics.

(i) Divide the project into manageable task and manageable processes. This process helps in project planning and control.

(ii) Document every step and process and produced specific reports and other documents during system development to make development team accountable for system execution and these documents and reports become a reference for training and maintenance of system.

(iii) Assure the participation of Users, Managers and Auditors in the project. These generally provide approvals, often called signoff at pre-established points and this signify the approval of development process and system being developed.

(iv) The system must be tested thoroughly prior to implementation to ensure that it meets user's requirement.

(v) A training plan should be developed for those who will operate and use the new system.

(vi) A post implementation review of developed system must be performed to assess the efficiency and effectiveness of system.

An Organization System Development Methodology should be documented in the form of system development standards manual.

10. What are the factors on which information requirement depends? [8]

Answer:

Followings are important factors on which information requirement of executive depends

i. Operational Function: Different operational functions need different kind of information in terms of their content and characteristics. For example in case of production, the content of information required may be about the production targets to be achieved, resources available and so on. Whereas in the case of marketing function, the content of information may be about the consumer behaviour, new product impact in the market etc. The characteristics of information are also influenced by an operational function. For example, the information required by accounts department for preparing payroll of the employees should be highly accurate in-comparison to production target information etc

ii. Type of Decision Making:
Programmed decisions (Structured Decision): Decisions, which are of repetitive and routine in nature are known as programmed decisions. For example, preparation of payroll and disbursement of pay through bank account.

Nature of information Required: Regular, Specific, Accurate, Information has great effect on Decision

Non-Programmed decisions (Unstructured Decisions): Decisions which are unstructured and involved high consequences and are complex or have a major commitment are known as non-programmed decision. The decisions which, cannot be easily automated are also known as Unstructured Decisions. These types of decisions have no pre-established decision procedure. Also, it is difficult to completely specify the information requirement for taking these decisions.

Nature of information Required:- Regular as well as Adhoc, Specific as well as General, Accurate, Information has less effect on decisions.

iii. Level of Management Activity:

Strategic Level: Strategic level management is concerned with development of organizational mission, objectives and strategies. Through strategies top management tries to relate a company with its environment. It is essentially take decisions regarding what products to produce and in what market to introduce. Based on strategic decisions resources will be allocated to the various divisions and units in the organizations to achieve the objectives.

Nature of Information Required- External Environment (Detailed): Internal functional (concise), Present and future: complex.

Tactical Level: Tactical level lies in middle of managerial hierarchy. At this level managers plan, organize , lead, and control a activities. They co-ordinate the activities of a sub-unit, for example marketing, finance, etc. They also ensure that resources are obtained and used efficiently in the accomplishment of organization objectives.

Nature of Information Required:- Regular, Specific, Accurate, Simple, present, internal, external, Reliable, Complete.

Supervisory Level: This is the lowest level in management hierarchy. The managers at this level coordinate the work of other who are not themselves managers. They ensure that specific tasks are carried out effectively and efficiently.

Nature of information Required:- Regular, Specific, Accurate, Simple, internal, Reliable, Complete, Historical.

11. (a) What are the Characteristics of a good ERP System? [4]

Answer:

Some of the important characteristics, which an ERP system should have are:

(i) Flexibility: An ERP system should be flexible to respond to changing needs of business. An ERP should be easily changeable to accommodate the frequent changing requirement of businesses.

(ii) Modular & Open: ERP system should be based on an open system architecture i.e. any module of business process can be attached or detached without affecting other modules.

(iii) Comprehensive: ERP system should be comprehensive to support wide range of functionality of business i.e. ERP should cover each and every detail of business working.

(iv) Beyond the Company: ERP system should have the capabilities to connect itself with external databases, with other organization applications and databases (Customers and Suppliers Databases).

(v) Best Business Practices: ERP system should employ best business practices and processes applicable worldwide. An ERP system package's logics and solutions impact company's strategy, culture and working.

(vi) New Technologies: ERP system should incorporate the use of latest technologies available like, internet, intranet, Data Mining, Data Warehousing etc.

(b) Explain the guidelines for ERP Implementation. [4]

Answer:

Guidelines for ERP Implementation:

(i) Understand Corporate Needs and Culture: ERP implementation requires a change in roles of different department, authority and skills-sets etc. Therefore, it is necessary to understand the need for change for choosing the right ERP-solution.

(ii) Complete Business Process Changes (Do BPR): A good ERP implementation requires the business processes to be best type. Therefore, it is necessary to change business processes to bring to best. Because, after implementation it is difficult to bring the changes in core business processes.

(iii) Communicate across the Organization: Executives across the organization should be informed about changes and should be well communicated by training programs etc for requirement of these changes.

(iv) Provide Strong Leadership: There should be an active team not just supportive team from organization for successful ERP implementation. There should be team, which must be capable of change management and in process of redesign and integration.

(v) Ensure and Efficient and capable project manager: The result of integration and redesign of processes means that projects are more complex. Thus, the project and its leader must deal effectively with new technology for successful implementation.

(vi) Create a Balance Team: ERP team must be selected from the best in the company and should comprise those who have the ability to learn the new system, pick up the package-programming environment quickly.

(vii) Select a Good Implementation Methodology: A good practice would be to choose a good implementation methodology, preferably one where guidelines are available for determining the efforts required (mainly in man hours) for carrying out the various activities.

(viii) Train Every One: A new system means new ways of adapting and operating. This will require extensive training at various levels.

(ix) Commitment to adapt changes: An ERP implementation should not be looked upon as short distance run. It has wide implication and would impact the future of company for many years to come. Implementation is long process. There should be clear commitment for this process for an effective ERP implementation.

12. (a) What are the functions of Controller under Information Technology Act? [4]

Answer:

Functions of Controller under Information Technology Act

With respect to Digital Certificates

i. Specifying the form and content of a Digital Signature Certificate and the key
ii. Specifying the content of advertisements for Digital Signature Certificate and the Public Key

With respect to Certifying Authorities

i. Exercising supervision over their activities
ii. Laying down the duties of the and the standards to be maintained by them
iii. Certifying their public keys
iv. Specifying the qualifications and experience of their employees
v. Specifying the conditions for conduct their business;
vi. Facilitating the establishment of their electronic system
vii. Maintaining a data-base containing their disclosure record
viii. Specifying the form and manner in which accounts shall be maintained
ix. Specifying the terms and conditions subject to which auditors may be appointed
x. Manner in which they shall conduct their dealings with the subscribers
xi. Resolving any conflict of interests between them and the subscribers

(b) Who can make application for Digital Signature Certificate? [4]

Answer:

Certifying Authority to issue Digital Signature Certificate

i. Any person may make an application to the Certifying Authority for the issue of a Digital Signature Certificate with fees not exceeding twenty-five thousand rupees which may be different for different services
ii. The Certifying Authority may grant the Certificate or reject the application after opportunity of showing cause.
iii. The applicant will be given the private key corresponding to the listed public key.