

**PAPER 6: SYSTEM ANALYSIS DATA PROCESSING AND QUANTITATIVE TECHNIQUES  
MAY 2000**

Question No.1 is compulsory.  
Answer any four from the remaining six questions.

**Question 1**

- (a) Discuss the three approaches of MIS development. **(10 Marks)**
- (b) In a chemical industry two products A and B are made involving two operations. The production of B also results in a by-product C. The product A can be sold at a profit of Rs.3 per unit and B at a profit of Rs.8 per unit. The by-product C has a profit of Rs.2 per unit. Forecasts show that up to 5 units of C can be sold. The company gets 3 units of C for each unit of B produced. The manufacturing times are 3 h per unit for A on each of the operation one and two and 4 h and 5 h per unit for B on operation one and two respectively. Because the product C results from producing B, no time is used in producing C. The available times are 18 h and 21 h of operation one and two respectively. The company desires to know that how much A and B should be produced keeping C in mind to make the highest profit. Formulate LP model for this problem. **(10 Marks)**

**Question 2**

- (a) Explain prototyping approaches to systems development. **(5 Marks)**
- (b) What are the advantages of prototyping approaches? **(5 Marks)**
- (c) ABC airline operating 7 days a week has given the following time-table. Crews must have a minimum layover of 5 hours between flights. Obtaining the pairing flights that minimizes the layover time away from home. For any given pairing the crew will be based at the city that results in the smaller layover. **(10 Marks)**

Hyderabad – Delhi			Delhi – Hyderabad		
Flight No	Depart.	Arrive	Flight No	Depart.	Arrive
A1	6 A.M.	8 A.M.	B1	8 A.M.	10 A.M.
A2	8 A.M.	10 A.M.	B2	9 A.M.	11 A.M.
A3	2 P.M.	4 P.M.	B3	2 P.M.	4 P.M.
A4	8 P.M.	10 P.M.	B4	7 P.M.	9 P.M.

**Question 3**

- (a) Draw the system flow chart for a materials inventory control system and explain the factors involved in its design. **(10 Marks)**
- (b) A project has the following time schedule: **(10 Marks)**

Activity	Time in weeks	Activity	Time in weeks
1-2	4	5-7	8
1-3	1	6-8	1
2-4	1	7-8	2
3-4	1	8-9	1
3-5	6	8-10	8
4-9	5	9-10	7
5-6	4		

Construct a PERT network and compute:

- (i)  $T_E$  and  $T_L$  for each event;  
(ii) Float for each activity; and  
(iii) Critical path and its duration.

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**Question 4**

- (a) In what different ways could system conversion from old system to the new one take place? Explain briefly. **(10 Marks)**
- (b) A company produces a small component for all industrial products and distributes it to five wholesalers at a fixed price of Rs.2.50 per unit. Sales forecasts indicate that monthly deliveries will be 3,000, 5,000, 10,000, 5,000 and 4,000 units to wholesalers 1,2,3,4 and 5 respectively. The monthly production capabilities are 5,000, 10,000, 12,500 at plants 1,2 and 3 respectively. The direct costs of production of each unit are Rs.1.00, Rs.0.90 and Rs.0.80 at plants 1,2 and 3 respectively. The transportation costs of shipping a unit from a plant to a wholesaler are given below:

		Wholesaler				
		1	2	3	4	5
Plant	1	0.05	0.07	0.10	0.15	0.15
	2	0.08	0.06	0.09	0.12	0.14
	3	0.10	0.09	0.08	0.10	0.15

Find how many components each plant supplies to each wholesaler in order to maximize profit.

**(10 Marks)**

**Question 5**

- (a) Many computer users consider recruiting, training and retaining qualified personnel as their greatest problem. Why? **(5 Marks)**
- (b) Explain the role of user support manager. **(5 Marks)**
- (c) A book-store wishes to carry Systems Analysis and Design in stock. Demand is probabilistic and replenishment of stock takes 2 days (i.e., if an order is placed in March 1, it will be delivered at the end of the day on March 3). The probabilities of demand are given below:

Demand (daily)	0	1	2	3	4
Probability	0.05	0.10	0.30	0.45	0.10

Each time an order is placed, the store incurs an ordering cost of Rs.10 per order. The store incurs a carrying cost of Rs.0.50 per book per day. The inventory carrying cost is calculated on the basis of stock at the end of each day. The manager of the book-store wishes to compare two options for his inventory decision:

- A. Order 5 books, when the inventory at the beginning of the day plus orders outstanding is less than 8 books.
- B. Order 8 books, when the inventory at the beginning of the day plus orders outstanding is less than 8 books.

Currently (beginning of the 1<sup>st</sup> day) the store has stock of 8 books plus 6 books ordered 2 days ago and expected to arrive next day. Using Monte-Carlo simulation for 10 cycles, recommend which option the manager should choose?

The two digit random numbers are given below: 89, 34, 78, 63, 61, 81, 39, 16, 13, 73.

**(10 Marks)**

**Question 6**

- (a) Discuss the benefits which accrue to the user of good methods and performance standards. **(5 Marks)**
- (b) Explain the main functions of the manual of standards. **(5 Marks)**
- (c) A fertilizer company distributes its products by trucks loaded at its only loading station. Both company trucks and contractor's trucks are used for this purpose. It was found out that on an average one truck arrived at every five minutes and the average loading time was 3 minutes. 40% of the trucks belong to contractors. You are required to determine:
- (i) The probability that the truck has to wait.

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(ii) The waiting time of a truck that waits.

(iii) The expected waiting time of contractor's trucks per day. Assume that the company has 24 hrs. shift.

**(10 Marks)**

**Question 7**

Write short notes on the following:

**(5+5+5+5)**

- (i) Bench Marking Problem for Vendor's Proposals
- (ii) File Control.
- (iii) Decision Trees
- (iv) Resources Levelling.