END TERM EXAMINATION

Paper code: MCA329   subject: Operational Research
Paper ID: 44329   (Batch: 2005-2009)
Time: 3hrs   Maximum marks: 60

Note: Q.1 is compulsory. Attempt one question from each unit.

Q1 Answer the following questions: -   (5X4=20)
     (a) Write short notes on phases of operation research.
     (b) Differentiate between PERT and CPM.
     (c) State Bellman's Principle of optimality.
     (d) Explain Transportation Problem.
     (e) Explain Economic interpretation of duality in LPP.

UNIT-I

Q2 Solve the following LPP by simplex method   (10)
Max p = x+2y+3z, 7x<=6, x+2y<=20, 3y+4z<=30, x>=0, y>=0, z>=0

Q3 (a) A firm owns facilities at six places. If 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 labels. If the firm wants to minimize its total transportation cost, how would it route its products:

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

(b) Write short note on Assignment Problem.

UNIT-II

Q4 The normal and crash duration with cost for various activities involved in a repair work is given below. The direct cost for supervision of the work is also indicated. (10)

| Activity | time(days) | | cost(rs) | | expediting |
	Normal	crash	normal	crash	cost/day(rs)
1-2	6	2	4000	12000	2000
1-3	8	3	3000	6000	600
2-4	7	4	2800	4000	400
3-4	12	8	9000	11000	500
4-6	3	1	10000	13000	1500
5-6	5	2	4900	7000	700
3-5	7	3	1800	5000	800
5-7	11	5	6600	12000	900
6-7	10	6	4000	8400	1100
total			46100	78400	

The indirect cost is rs. 2000 per day.
   (a) Draw a network diagram for these activities indicating the earliest start and latest finishing time at each node.
   (b) What is the normal and ultimate crash duration of the project?
   (c) Considering the effect of direct and indirect cost, find the optimum project cost.

Q5 Explain Max flow problem and prove Max-Flor min-cut theorem.   (10)

UNIT-III

Q6 A 4-ton vessel is loaded with one or more of three items. The following table gives the unit weight, W_i, in tons and the unit revenue in thousands of rupees R_i, for item i. how should the vessel be loaded to maximize the total return?   (10)

Item I	Wi	Ri
1	2	31
2	3	47
3	1	14

Q7 Find an optimal sequence for the following sequence for the following sequencing problem of four jobs and five machines when passing is not allowed of which processing time (in hours) is given below: -   (10)

Job	machine				
	A	B	C	D	E
1	7	5	2	3	9
2	6	6	4	5	10
3	5	4	5	6	8
4	8	3	3	2	6

Also, find the total elapsed time.

UNIT-IV

Q8 (a) A company works 50 weeks in a year. For a certain part, included in the assembly of several parts, there is an annual demand of 10000 units. This part may be obtained from either an outside supplier or from a subsidiary company. The following data relating to the part are given: -

	From outside supplier Rs.	from a subsidiary company Rs.
Purchase rice per unit	12	13
Cost of placing an order	10	10
Cost of receiving an order	20	15
Storage & all carrying costs, Including capital cost/unit Per annum	2	2

What purchase quantity and from which source you recommend. What would be the minimum total cost? (5)

(b) Problems arrive at a computer centre in Possion fashion with a mean arrival rate of 25per hour. The average computer job requires 2 minutes of terminal time. Calculate
(i) Average number of problems waiting for computer. (ii) The percent times an arrival can arrive in without having to wait. (5)

Q9 Write a short note on the following: - (5+5=10)
   (a) Inventory control
   (b) Characteristics of M/M/c queuing model.

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