LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE

FIFTH SEMESTER – NOVEMBER 2007

CS 5503 - RESOURCE MANAGEMENT TECHNIQUES

AK 12

Date : 29/10/2007 Dept. No. Max. : 100 Marks
Time : 9:00 - 12:00

PART – A

Answer ALL the Questions: (10 x 2 = 20)

1. Define slack and surplus variables. Give examples.
2. What is meat by dual LPP?
3. What is a transportation problem?
4. What is meant by a degenerate solution in a transportation problem?
5. Distinguish between PERT and CPM.
6. What is the difference between the normal time and the crash time?
7. What is a carrying cost in inventory?
8. Define 'lead time'.
9. What are the 3 types of replacement policies?
10. Define present worth factor.

PART - B

Answer ALL the Questions: (5 x 8 = 40)

11. a) Three products A, B and C are processed through three different machines. The time, in minutes, required per unit of each product, the daily capacity of the operations (in munutes per day) and the profit per unit sold for each product, in rupees, are given below:

Operations	**Time Per Unit (Minutes)**			**Operation capacity**
	Product A	**Product B**	**Product C**	
1	30	40	30	430
2	50	0	40	460
3	30	60	20	420
Profit/unit	12	11	13	

The zero time indicates that the product does not require that machine. It is assumed that all the units produced are sold. The company wants to determine the optimum production of three products that yields maximum profit. Formulate this as a suitable OR problem.

(OR)

b) Solve the following LPP by graphical method.

Minimise: $z = 2x - y$

Subject to: $x = 2y \leq 5;$

$x + y \leq 8;$

$x, y \geq 0.$

12. a) Obtain the initial basic feasible solution for the following transportation problem by the Vogel's method.

	Source				**Requirement**
Destination	11	13	17	14	250
	16	18	14	10	300
	21	24	13	10	400
Availability	200	225	275	250	

b) Solve the following assignment problem:

	I	II	III	IV
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

13. a) There are five jobs each of which must go through two machines X and Y in the order XY. The processing times in hours are given in the following table. What should be the sequence for the five jobs that will minimize the elapsed time T?

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

b)Find the critical path for the following PERT chart.

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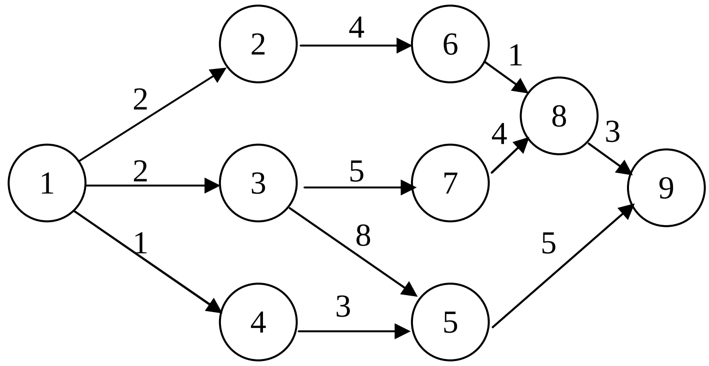

14. a) A transport company uses a certain part at a constant rate of 2500 per year. Each unit costs Rs. 30 and the company personnel estimate that it costs Rs. 130 to place an order, and that the carrying cost of inventory is 10% per year. How frequently should the orders be placed? Also determine the optimum size of each order?

(OR)

b) For a fixed order quantity system, find out the various parameters for an item with the following data:

Annual consumption (D) = 10,000. units
Cost of oneunit = Rs. 1.00
Cs = Rs. 12.0 per production run
C1 = Rs. 0.24 per unit.
Past lead times: 15 days, 25 days, 13 days, 14 days, 30 days, 17 days.

15. a) The cost of a machine is Rs. 6100 and its scrap value is Rs.100. The maintenance costs are given below. When should the machine be replaced?

Year	1	2	3	4	5	6	7	8
Maintenance Cost	100	250	400	600	900	1200	1600	2000

b) Using the following table, find the cost pattern for each machine, when money is worth 10% per year, and hence find which machine is less costly.

Year	Cost at the Beginning of Year	
	Machine A	Machine B
1	900	1400
2	600	100
3	700	700

PART - C

Answer any TWO Questions: **(2 x 20 = 20)**

16. a) Using the principle of duality, solve the following LPP.

Minimize: $Z = 4X_1 + 3X_2 + 6X_3$

Subject to:

$X_1 + X_3 \geq 2$

$X_2 + X_3 \geq 5$

$X_1, X_2, X_3 \geq 0.$

17. Starting with the North-West corner rule, obtain the optimum solution to the following transportation problem.

Cost of transporting one unit from-to		To Stores			Availability
		S1	S2	S3	
From Warehouse	W1	7	3	4	2
	W2	2	1	3	3
	W3	3	4	6	5
Requirement		4	1	5	10

18. The table given below summarizes the failure rates of an electronic component of a TV set. The cost of replacing an individual failed component is Rs. 1.25. The decision is made to replace all these components simultaneously at fixed intervals, and to replace the individual component as they fail in service. If the cost of group replacement is Rs.0.30 per unit, what is the best interval between group replacements? At what group replacement price per component would a policy of strictly individual replacement become preferable to the adopted policy?

End of Year	1	2	3	4	5	6	7	8
Probability of failure to date	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.00

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