

**COURSE CODE - 2030602**  
**PG DEGREE EXAMINATION - JAN 2009**

**MBA (ALL BRANCHES)**

**APPLIED OPERATIONS RESEARCH FOR MANAGEMENT**

**(For Candidate Admitted from Calendar 2007 Onwards)**

**Time: 3 Hours**

**Max.Marks:75**

**Section-A**

**Answer All the Questions:**

**15 X 1 = 15**

1. Define slack variable?
2. What are the artificial variable techniques of solving LPP?
3. Define optimum solution?
4. When a transportation problem is said to be balance?
5. State the method of finding feasible solution of transportation problem?
6. State one of the methods of solving an assignment problem?
7. Define fair game?
8. Define sequencing problems?
9. What is total elapsed time?
10. What is dummy activity?
11. What are the replacement situations?
12. Define total float?
13. What do you mean by payoff?
14. Define statistical decision theory?
15. What is a state of nature?

**Section-B**

**Answer any Five Questions:**

**5 X 6 = 30**

16. a. State and explain the basic assumptions of LPP?

**(Or)**

b. Solve the following problem graphically

$$\text{Max } Z = 6x_1 + 8x_2 \text{ subject to}$$

$$30x_1 + 20x_2 \leq 300, \quad 5x_1 + 10x_2 \leq 110 \text{ and } x_1, x_2 \geq 0$$

17. a. Explain north-west corner rule for obtaining a starting feasible solution for transportation problem?

**(Or)**

b. The assignment cost of assigning any one operator to any one machine is given in the following table.

	<b>Operators</b>				
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
<b>Machine</b>	<b>A</b>	10	5	13	15
	<b>B</b>	3	9	18	3
	<b>C</b>	10	7	3	2
	<b>D</b>	5	11	9	7

Find the optimal assignment by Hungarian method?

18. a. Write the steps of Johnson's algorithm for sequencing problems of n jobs and 2 machines?

**(Or)**

b. Using graphical method, solve the game whose payoff matrix is

$$\begin{pmatrix} 2 & 4 & -2 & 8 \\ 3 & 6 & 5 & -5 \end{pmatrix}$$

19. a. Distinguish between PERT and CPM?

(Or)

b. A firm is considering replacement a machine whose cost price is Rs.12, 200 and the scrap value Rs.200. The running (maintenance and operating) costs in Rs are found from experience to be as follows:

Year	1	2	3	4	5	6	7	8
Running Cost	200	500	800	1200	1800	2500	3200	4000

20. a. Explain decision making under uncertainty?

(Or)

b. Explain EMV and EVPI.

**Section- C**

Answer any Two Questions:

2 X 15 =30

21. Using simplex method, find non-negative values of  $x_1$  and  $x_2$  which minimize  $Z = 3x_1 + 2x_2$  subject to the constraints  $7x_1 + 2x_2 \geq 14$ ,  $2x_1 + x_2 \geq 6$  and  $x_1 + x_2 \geq 5$ .

22. A company has to transport its product from 3 plants to 3 distribution centres. The availability and demand of units of product, with unit transportation costs in rupees are given below. Find the optional transport pattern.

		Distribution Centre			Availability (Units)
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	
Plant	P <sub>1</sub>	16	19	12	140
	P <sub>2</sub>	12	13	19	160
	P <sub>3</sub>	14	28	8	
Demand (Units)		100	150	170	

23. Five jobs are to be processed on three machines M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub>. The processing times in hours are as below.

Job	1	2	3	4	5
M <sub>1</sub>	4	9	7	10	3
M <sub>2</sub>	4	5	3	2	6
M <sub>3</sub>	7	8	10	7	8

Find a sequence of jobs that minimize the total elapsed time.

24. A small PERT project consists of 12 activities whose time estimates in days are as below (a-optimistic, m-most likely, b-pessimistic).

Activity	a	m	b	Activity	a	m	b
1 - 2	7	10	12	2 - 3	26	33	40
2 - 4	5	8	10	3 - 4	7	10	12
3 - 5	4	5	8	4 - 6	5	7	10
5 - 8	8	11	12	6 - 7	2	3	7
6 - 10	6	9	13	7 - 9	5	6	9
8 - 9	5	11	17	9 - 10	2	5	14

Determine the critical path and its length and also find the probability that the project will be completed two days earlier than expected.

25. Find the best alternative from the following prior distributions.

Demand	0	1	2	3	4
Probability	0.1	0.2	0.3	0.25	0.15

Given cost price = 2

Selling price = 3