

FACULTY OF ENGINEERING

B.E. IV/IV (M/P) I SEMESTER (New) (Main) Examination, Nov./Dec., 2009
OPERATIONS RESEARCH

Time : 3 Hours]

[Max. Marks : 75

Note : Answer **all** questions from Part – A. Answer **five** questions from Part – B.**PART – A****(10 × 2.5 = 25 Marks)**

1. What are the advantages and limitations of LP models ?
2. Discuss in brief the role of OR model in decision making.
3. What is degeneracy in transportation problem ?
4. Explain briefly the importance of replacement analysis.
5. Construct dual for the following LP model :

$$\text{Max } Z = -5x_1 + 2x_2$$

$$\text{Subject to } x_1 - x_2 \geq 2$$

$$2x_1 + 3x_2 \leq 5$$

$$x_1, x_2 \geq 0$$
6. What are the limitations of Game theory ?
7. Give a brief description about various types of queues.
8. What are the assumptions involved in sequencing models ?
9. Discuss some important applications of Queuing theory.
10. What is the principle of dominance in games ?

PART – B**(5 × 10 = 50 Marks)**

11. Use simplex method to minimize $Z = 5x + 4y$
 subject to $4x + y \geq 40$
 $2x + 3y \geq 90$
 $x, y \geq 0$ 10
12. Use dual simplex method to solve the LPP
 Minimize $Z = 3x_1 + x_2$
 subject to $2x_1 + 2x_2 \geq 2$
 $4x_1 + 6x_2 \geq 4$
 $x_1, x_2 \geq 0$ 10

(This paper contains 2 pages)

13. Solve the following travelling salesman problem :

10

| From To | A | B | C | D | E |
|------------|----------|----------|----------|----------|----------|
| A | ∞ | 6 | 12 | 6 | 4 |
| B | 6 | ∞ | 10 | 5 | 4 |
| C | 8 | 7 | ∞ | 11 | 3 |
| D | 5 | 4 | 11 | ∞ | 5 |
| E | 5 | 2 | 7 | 8 | ∞ |

14. (a) Discuss in brief replacement procedure for the items that deteriorate with time. 5
- (b) Solve the following game of two players A and B. 5

| | | Player B | | | |
|----------|---|----------|----|---|----|
| | | 1 | 2 | 3 | 4 |
| Player A | 1 | 6 | 2 | 4 | 8 |
| | 2 | 2 | -1 | 1 | 12 |
| | 3 | 2 | 3 | 3 | 9 |
| | 4 | 5 | 2 | 6 | 10 |

15. Vehicles pass through a toll gate at a rate of 90/hr. The average time to pass through the gate is 36 sec. The arrival and service follow poisson distribution. The authorities are willing to install one more gate to reduce the average time to pass through toll gate to 30 sec, if the idle time of toll gate is less than 10% and average queue length is more than 5 vehicles. Find whether the installation of the second gate is justified. 10
16. Determine the optimum sequence that minimizes total elapsed time for the following sequencing model. 10

| Job | | 1 | 2 | 3 | 4 | 5 | 6 |
|------------------------|-------|---|---|----|---|---|---|
| Processing time (hrs.) | M/c A | 3 | 8 | 7 | 5 | 4 | 2 |
| | M/c B | 3 | 4 | 2 | 1 | 3 | 5 |
| | M/c C | 5 | 8 | 10 | 7 | 9 | 6 |

17. Write a short note on any **three** of the following : 10
- (i) Sensitivity Analysis
 - (ii) Group Replacement Policy
 - (iii) Duality principle
 - (iv) Mathematical formulation of transportation model.