

FACULTY OF ENGINEERING

B.E. 4/4 (M/P) I-Semester (Supplementary) Examination, June/July, 2011

OPERATIONS RESEARCH

Time : Three Hours]

[Maximum Marks : 75

Answer ALL questions from Part A. Answer any FIVE questions from Part B.

PART—A (Marks : 25)

1. Explain in brief : (i) Feasible solution, (ii) Optimum solution, (iii) Bounded solution space, (iv) Unbounded solution space. 4
2. What is an unbalanced assignment problem ? Explain in brief how to solve it. 3
3. What is Duality in LPP ? 2
4. Explain Queue discipline in brief. 2
5. What is replacement theory ? Why is it necessary to replace an equipment/machine ? 2
6. What are the fundamental assumptions in a queuing modal specially for arrivals and service ? 3
7. How do you confirm that a transportation problem has multiple optimum solutions ? 3
8. What is degeneracy in Simplex ? 2
9. List out assumptions in sequencing. 2
10. Explain in brief "operations research". 2

PART—B (Marks : 50)

11. Solve the following LPP :

Maximize : $Z = 10x + 15y + 20z$

STC : $10.7x + 5y + 2z \leq 2705$

$5.4x + 10y + 4z \leq 2210$

$0.7x + y + 2z \leq 445$

$x, y, z \geq 0$

12. Solve the following Assignment problem :

		MACHINES					
		1	2	3	4	5	6
M E N	a	18	24	20	16	14	22
	b	20	18	22	18	16	14
	c	16	18	14	19	20	22
	d	24	22	16	14	18	15
	e	14	16	19	22	20	18

13. Initial cost of an equipment is ₹ 6,00,000 and the following data shows its maintenance schedule in the past. Determine optimal replacement policy.

Year (end)	1	2	3	4	5	6
Maintenance Cost (₹)	4500	4700	5000	5500	6500	7500
Resale value (₹)	27,000	25,300	24,000	21,000	18,000	13,000

14. (a) Define : (i) Renaging, (ii) Balking and (iii) Jockeying.
 (b) Customers arrive at a service counter according to Poisson distribution with an average of 15 customers per hour. Service is provided according to exponential distribution and it takes 3 minutes to clear a customer on an average. Determine :
 (i) Probability that a customer will have to wait on his arrival.
 (ii) Average waiting time of a customer.
 (iii) Number of Idle hours that the server spends at the counter spends in a day of 8 hours.
15. (a) Explain in brief S.M. Johnson's rules in sequencing.
 (b) Determine total elapsed time for the following :

Jobs M/cs	Jobs							
	J1	J2	J3	J4	J5	J6	J7	J8
M/c-I	18	20	16	22	16	19	23	14
M/c-II	16	24	18	19	12	17	18	17

16. Write short notes :
 (a) Unbalanced transportation problem
 (b) Linear programming and Simplex method
 (c) Rules to be followed in converting a Primal LPP into its Dual LPP form
 (d) Travelling salesman problem.
17. Solve the following transportation problem :

		To			Supply
		D1	D2	D3	
From	F1	8	7	6	45
	F2	4	9	10	65
	F3	6	9	5	40
Demand		70	30	50	