[5354]-5
B.E. Civil
Systems Approach in Civil Engineering
(2008 Pattern) (Elective - I) (Semester - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Solve. Q.1 or Q.2, Q.3 or Q.4, Q.5, Q.6 or Q.7, Q.8 or Q.9, Q.10 or Q.11.*

2) *Figures to the right side indicate full marks*

3) *Use of Calculator is allowed.*

4) *Assume suitable data if necessary.*

Q1) a) What is the difference between simplex solution procedure for a maximization and minimization problem? Explain by giving suitable example. **[6]**

b) Explain any four of following by giving suitable examples. **[10]**

　　i) Unbounded solution.

　　ii) Infeasible solution.

　　iii) Slack variable.

　　iv) Surplus variable.

　　v) Artificial variable.

OR

Q2) a) Solve the following problem using LPP method Maximize $Z = 4x_1 + 10x_2$

Subject to **[8]**

$$2x_1 + x_2 \leq 50$$
$$2x_1 + 5x_2 \leq 100$$
$$2x_1 + 3x_2 \leq 90$$
$$x_1, x_2 \geq 0$$

P.T.O

b) State which of the following functions are convex or concave. **[8]**

1) $F(x) = x_1^2 + 6x_2^2$

2) $F(x) = x_1^2 + 4x_1 x_2$

Q3) a) Expain the degeneracy in transportation problem. **[6]**

b) Sovle following transportation problem using North West corner method and Least cost method. **[10]**

Destination

Origins		D1	D2	D3	D4	
	O1	13	22	24	18	200
	O2	23	14	16	21	300
	O3	19	25	17	26	150
	O4	20	15	27	28	250
Demand		300	300	100	200	Supply

OR

Q4) a) Write the steps following in VAM method. **[8]**

b) Solve following assignment problem. **[8]**

	J1	J2	J3	J4	J5
A1	54	55	67	37	48
A2	45	44	66	78	53
A3	65	57	49	54	56
A4	43	72	55	63	35
A5	75	65	70	45	42

Q5) a) What is the need of Dynamic Programming? How is it different from Linear Programming? **[6]**

b) A gas pipeline is to be laid between two cities A and E, Making it pass through one of the four locations in each of the intermediate towns. B, C and D. The associated costs (in thousands of Rs.) are As follows :**[12]**

i-j	cost	i-j	cost
A - B1	15	B3 - C1	18
A - B2	14	B3 - C2	14
A - B3	22	B3 - C3	28
B1- C1	14	C1 - E	22
B1 - C2	28	C2 - E	27
B1 - C3	14	C3 - E	23
B2 - C1	15		
B2 - C2	22		
B2 - C3	14		

Find the minimum cost of the pipeline.

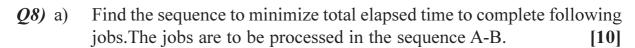**Q6)** a) Differentiate between Golden Section method and fibonacci method by giving suitable example. **[8]**

b) Write the steps used in steepest descent method of minimization. **[8]**

OR

Q7) a) Explain following. **[8]**

    i) Hessian Matrix

    ii) Unimodal function

    iii) Local optima

    iv) Global optima

b) Wite the steps in Newtons method. **[8]**

Q8) a) Find the sequence to minimize total elapsed time to complete following jobs. The jobs are to be processed in the sequence A-B. **[10]**

Jobs (Processing time is minutes)

Machines		1	2	3	4	5	6	7
	A	12	6	5	11	5	7	6
	B	7	8	9	4	7	8	3

Find the total elapsed time.

b) What is simulation? Describe its advantages and limitations with suitable examples. **[6]**

OR

Q9) a) A prefab company keeps a stock of blocks. Daily demand based on past experience is as given below. **[10]**

Daily demand (in thousand nos.)	0	15	25	35	45	50
Probability	0.01	0.12	0.18	0.45	0.22	0.02

Consider following sequence of random numbers.

83, 63, 47, 52, 47, 36, 57, 04, 79, 55, 10, 13, 57, 09, 16

Using the sequence, simulate the demand for next 15 days. What is the average daily demand?

b) Define a queue and explain the various queue disciplines. **[6]**

Q10) a) Solve the following Game theory. **[8]**

Y

X

3	5	2	8
2	6	3	1
4	7	3	9

b) Explain how the theory of replacement is used in replacement of items whose maintenance cost varies with time. **[8]**

OR

*Q11)*a) For what type of business problems might game theory is useful? **[8]**

b) A firm is thinking of replacing a particular machine whose cost price is Rs. 50,000. The installation charges amount to Rs 14,000 and ist scrap value is only Rs. 6,000. The maintenance costs are found to be as follows. Determine when the firm should get the machine replaced. **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	1,000	3,000	4,000	6,000	8,400	11,600	16,000	19,200

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