Total No. of Questions :8]

SEAT No. :

P4229

[Total No. of Pages :4

[4860]-612

M.E. (Civil) (Water Resources and Environmental Engg.)

OPTIMIZATION TECHNIQUES

(2012 Course) (Semester - II) (501608)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION-I

Q1) a) Solve graphically. **[12]**

$Z_{max} = 2X_1 + 3X_2$

Subject to $X_1 + X_2 \leq 30$

$X_2 \geq 3$

$0 \leq X_2 \leq 12$

$0 \leq X_1 \leq 20$

$X_1 - X_2 \geq 0$

b) Write the applications of optimization techniques to water resource engineering. **[6]**

Q2) a) Show the following cases by graphical means and explain. **[8]**

i) Unique solution

ii) Infinite solution

iii) Unbalanced solution

iv) No solution

P.T.O.

b) Solve the following LP problems by the revised simplex method. **[8]**

Minimize $f = x_1 - 3x_2 + 2x_3$

Subject to $3x_1 - 3x_2 + 2x_3 \geq 7$

$-2x_1 - 4x_2 \leq 12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$

$x_i >= 0$, i = 1 to 3

Q3) a) Determine the maximum and minimum values of the function; **[8]**

$F(x) = 12x^5 - 45x^4 + 40x^3 + 5$

b) Define Saddle Point and its Significance. **[8]**

Q4) a) What is the difference between Fibonacci & Golden Section Method. **[8]**

b) Find the minimum of f = x (x – 1.5) in the interval (0, 1) to within 10% of the exact value. **[8]**

SECTION-II

Q5) a) What is dynamic programming? How it is different from linear programming? Also state the Bellman's Principle of optimality. **[6]**

b) A salesman located in city A decided to travel to city B. he knew the distances of alternative routes from city A to city B, the city of origin A, is city1 and the destination city B is city 10. Other cities through which the salesman will have to pass are numbered 2 to 9. Then fine the shortest route. **[10]**

Node	Distances	Node	Distances	Node	Distances
1-2	8	3-7	4	6-9	4
1-3	7	4-5	3	7-8	3
1-4	10	4-6	5	7-9	5
2-5	4	4-7	4	8-10	4
2-6	6	5-8	7	9-10	6
2-7	8	5-9	6		
3-6	10	6-8	5		

Q6) a) Determine the optimal sequence needed to process Job -1 and 2 on five machines A, B, C, D & E. For each machine find the job which should be done first. Also calculate the total time needed to completer both the jobs. **[12]**

Job-1	Sequence :	A	B	C	D	E
	Time (Hrs):	1	2	3	5	1
Job-2	Sequence :	C	A	D	E	B
	Time (Hrs);	3	4	2	1	5

b) State advantages and limitations of simulation technique. **[6]**

Q7) a) Discuss the fields of application for queuing theory. Explain queue discipline and its various forms. **[6]**

b) A sample of 100 arrivals of automobiles at toll both is found to be according to the following distribution; **[10]**

Time between arrivals in Min	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Frequency	2	6	10	24	20	15	10	7	4	2

The time taken for service follows the distribution.

Service Time in Min.	0.5	1.0	1.5	2.0	2.5
Frequency	13	22	37	20	8

Estimate the average % waiting time and idle time of a customer by simulation for next 10 arrivals. Use the following random numbers.

Arrivals:	16	77	23	02	77	28	06	24	25	93
Service:	56	65	05	61	86	90	92	10	79	80

Q8) a) Explain Two Person Zero Sum Game. Distinguish between pure strategy & mixed strategy. **[8]**

b) Reduce the following game by dominance and find the game value. **[8]**

	Player B				
Player A	Strategies	I	II	III	IV
	I	20	15	12	35
	II	25	14	8	10
	III	40	2	10	5
	IV	-5	4	11	0

EEE