Total No. of Questions : 10]

SEAT No. :

P2953

[Total No. of Pages : 4

[5154]-505
B.E. (Civil)
SYSTEMS APPROACH IN CIVIL ENGINEERING
(2012 Course) (Semester - I) (End Semester) (Elective - I) (401004 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain application of system approach in Civil Engineering? **[4]**

b) Define following terms **[6]**

i) Objective function

ii) Constraint

iii) Convex and Concave function

OR

Q2) a) State the algorithm of steepest gradient method. **[4]**

b) Find maximum of $f = x\ (1.5 - x)$ in the interval of (0, 1) within 10% accuracy using Dichotomous Search technique. Take $\varepsilon = 0.001$. Solve up to two iteration. **[6]**

Q3) a) Find the sequence that minimize the total elapsed time to complete the job in the order of AB **[6]**

Machine	Jobs Processing Time in Minutes				
	1	2	3	4	5
A	10	14	9	11	16
B	15	8	13	10	12

b) Explain operating characteristics of queuing theory. **[4]**

OR

Q4) a) What is mean by simulation? Explain the application of Monte Carlo Simulation. **[5]**

b) Minimize $Z = 2\ x_1^2 + 2x_1x_2 + 2\ x_2^2 - 4\ x_1 - 6x_2$

Take, $x^0 = [0\ 0]$ by Newton Method. **[5]**

P.T.O.

Q5) a) Explain 'Principle of Optimality' in context with Dynamic Programming. **[4]**

b) Find shortest path for a network with following data **[12]**

Node	Distance in kms	Node	Distance in kms
A-B	12	B-C	14
B-D	15	C-E	21
C-F	18	C-G	29
D-E	32	D-F	26
D-G	34	E-H	19
E-I	22	F-H	15
F-I	28	G-I	35
G-H	12	H-J	41
I-J	31		

OR

Q6) a) What is the need and applications of Dynamic Programming? **[4]**

b) Maximize the sales by allocating salesman to different zones as per amount of sales contribution as given below **[12]**

No of salesman	Zone 1	Zone 2	Zone 3
0	45	52	60
1	55	64	69
2	62	70	77
3	74	79	86
4	82	92	95
5	88	95	98
6	85	97	102
7	90	100	109

Q7) a) Minimize $Z = 6x_1 + 5x_2$ **[8]**

Subject to $20x_1 + 12x_2 \geq 200$

$8x_1 \geq 40$

$6x_2 \geq 30$

$x_1, x_2 > 0$

Use Simplex method to solve the problem.

b) Explain with the help of diagrams, following conditions in LPP **[8]**

i) Unbounded solution

ii) No feasible solution

iii) Infinite solution

iv) Unique solution

OR

Q8) a) Explain 'Two phase method'. Explain the application of this method in solving LP problems. **[6]**

b) Use Big M method to solve following **[10]**

Minimize $Z = 60\, x_1 + 80\, x_2$

Subject to

$x_1 \leq 400$

$x_2 \geq 200$

$x_1 + x_2 = 500$

$x_1, x_2 \geq 0$

Q9) a) Explain steps involved in V.A.M. **[6]**

b) Solve following assignment problem to minimize time (in minutes) required by 4 operators on 4 machines **[12]**

machines

Operators	I	II	III	IV
A	14	19	16	12
B	12	15	22	18
C	10	12	18	15
D	16	14	19	15
E	15	10	18	15

OR

Q10)a) Write a short note on assignment problem. **[4]**

b) Calculate transportation cost for following problem using V.A.M. **[6]**

destinations

origins		D1	D2	D3	D4	Supply
	O1	09	18	16	20	25
	O2	14	10	19	15	75
	O3	17	13	15	17	50
	O4	10	14	12	18	100
	Demand	60	50	100	40	

c) Optimize above problem using u-v method. **[8]**