(3)

Total No. of Questions – [8] Paper Code: Total No. of Printed Pages:3

G.R. No.	

U359-115 (ESE) Civil U359-125 (ESE) Comp
U359-145 (ESE) IT U359-155 (ESE) Mech
U359-135 (ESE) E&TC

DECEMBER 2019/ENDSEM

T. Y. B. TECH. (CIVIL ENGINEERING) (SEMESTER - I)

COURSE NAME: OPTIMIZATION TECHNIQUES

COURSE CODE: IE31175CV (PATTERN 2017)

Time: [**2 Hours**] [Max. Marks: **50**]

(*) Instructions to candidates:

1) **Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a) Describe various models of optimization used in Systems Approach. [6 marks]

OR

b) Determine where the function is convex or concave [6 marks]

a. $f(x)=x^4-2x^3-12x^2+1$.

b. $f(x)=x^4+2x^3-36x^2+2x+1$

c. $f(x)= -x^3+6x^2-2x+1$

Q.2) a) State the sequence and total time elapsed for the following jobs with operating times(in minutes) on two machines. Also give the idle time for both the machines. [6 marks]

Job	1	2	3	4	5
Machine A	12	6	10	14	8
Machine B	15	5	12	14	7

OR

b) Discuss the various components of a queuing model? Discuss Kendell's notation [6 marks]

Q.3) a) Solve the following transportation problem to minimize total transportation cost using North –west corner method and column minima method from plants to warehouses [6 marks]

From		To warehouses A	B	C	D	E	Plant capacity
plants	1	1	2	6	2	3	800
	2	3	4	5	8	1	600
	3	3	1	1	2	6	200
	4	4	7	3	5	4	400
demand		400	100	700	300	500	

OR

b) Find the solution for the following transportation problem using Voggel's Approximation method and row minima method. [6 marks]

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

Q.4) a) Write the standard form for the Simplex method problem using BigM method for maximization of Z. [4 marks]

MIN Z = 5x1 + 3x2

subject to

2x1 + 4x2 <= 12

2x1 + 2x2 = 10

5x1 + 2x2 >= 10

and x1,x2 >= 0

OR

b) Explain the meaning of duality in L.P. What are the advantages of solving a minimization problem by converting it into maximization problem? [4 marks]

Q. 5) a) Use Fibonacci method to maximize $f=16x-0.2x^2$ in the interval(0,100) to an accuracy of 0.1%. Carry out 3 stages of iteration. [6 marks]

b) Give application of Newton's method and also explain its algorithm. [4 marks]

c) Differentiate between Dichotomous and Golden Section method. [4 marks]

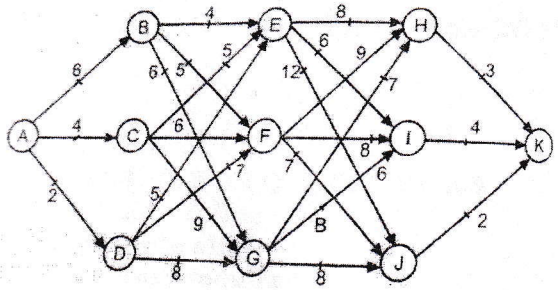
OR

Q.6) a) Using Dichotomous search method: Find maximum of function f(x) given as, f(x)=x(1.5-x) in the interval of (0,1) to an accuracy of 10%. [6 marks]

b) Compare the various one dimensional search techniques in NLP. [4 marks]

c) Give application of fibonnaci method and also explain its algorithm [4 marks]

Q.7) a) Miss XYZ, the project manager of ABC construction company is planning a business tour from Pune to Kolkata. She intends to cover one city from each of the company's different zone on route. The network shows clearly the three intermediate stages and three possible choices of route at all but last cities. The travel time between the two cities inclusive of the working time is given below the arrow between the cities. Use dynamic programming to determine the optimal distance from place 1 to second stage. Write recursive equation at each stage [6 marks]



b) Which intermediate cities should she visit to minimize the time required to get from A to K.? N [4 marks]

c) Discuss the applications of Dynamic Programming in your respective branch of Engineering. [4 marks]

OR

Q.8) a) A company is currently involved in negotiations with its union on the upcoming wage contract. Positive signs in the table represent wage increase while negative sign represents wage reduction. What are the optimal strategies for the company as well as the union? What is the game value? [6 marks]

Conditional costs to the company (₹ in lakhs)

Union strategies

Company strategies	U_1	U_2	U_3	U_4
C_1	+ 0.25	+ 0.27	+ 0.35	− 0.02
C_2	+ 0.20	+ 0.16	+ 0.08	+ 0.08
C_3	+ 0.14	+ 0.12	+ 0.15	+ 0.13
C_4	+ 0.30	+ 0.14	+ 0.19	+ 0.00

b) Write a short note on applications of Game theory [4 marks]

c) Explain forward and backward recursion [4 marks]