

Registration No:

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Total Number of Pages: 03

B.Tech
HSSM 3302

5th Semester Back Examination 2017-18

Optimization in Engineering

BRANCHE : AEIE, CHEM, CSE,

ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, FAT, IT, ITE, MANUFAC,
MANUTECH, MARINE, METTA, MINERAL, MINING, MME, PLASTIC, TEXTILE

Time: 3 Hours

Max Marks: 70

Q.CODE: B159

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions : **(2 x 10)**

a) Express the LPP in standard form

$$\text{Maximize } Z = 7x_1 - 4x_2$$

Subject to

$$3x_1 + x_2 \leq 5$$

$$2x_1 - x_2 \geq -4$$

$$x_1, x_2 \geq 0$$

b) Define a degenerate basic feasible solution.

c) Obtain the dual of the following problem

$$\text{Maximize } Z = -3x_1 + 5x_2$$

Subject to

$$x_1 - 3x_2 + 2x_3 \leq 6$$

$$2x_1 - x_2 + 5x_3 = 7$$

$$x_1, x_2, x_3 \geq 0$$

d) What is an integer programming problem?

e) Why transportation Problem is also a linear programming problem?

f) What do you mean by degeneracy in a transportation problem?

g) What are the basic characteristics of a queueing system?

h) What is Bordered Hessian matrix?

i) What is the advantage of Golden search method over Fibonacci search method?

j) Define local maximum and global maximum of a function.

Q2 a) Solve the following LPP by graphical method **(5)**

Minimize $Z=5x_1 + 3x_2$

Subject to

$$2x_1 - x_2 \leq 6$$

$$3x_1 + x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

b) Solve by Simplex method **(5)**

Minimize $Z=4x_1 + x_2$

Subject to

$$3x_1 + 4x_2 \geq 20$$

$$x_1 + 5x_2 \geq 15$$

$$x_1, x_2 \geq 0$$

Q3 Use revised simplex method to solve the following LPP **(10)**

Maximize $Z=3x_1 + 2x_2$

Subject to

$$x_1 + 2x_2 \leq 4$$

$$3x_1 + 2x_2 \geq 6$$

$$x_1 + 4x_2 \leq 2$$

$$x_1, x_2, x_3 \geq 0$$

Q4 Find the optimum integer solution of the following integer programming problem **(10)**

Minimize $Z=2x_1 + 3x_2$

Subject to

$$6x_1 - 3x_2 \leq 20$$

$$x_1 + 4x_2 \leq 10$$

$$x_1, x_2 \geq 0 \quad \text{are integers.}$$

Q5 a) Solve the transportation problem to maximize the profit **(5)**

	Destination				
Source	P	Q	R	S	Supply
A	40	25	22	33	10
B	44	35	30	30	30
C	38	38	28	30	70
Demand	40	20	60	30	

b) Solve the assignment problem

Job / Person	A	B	C	D
P	10	20	25	20
Q	12	35	15	10
R	33	20	12	26
S	17	23	26	25

Q6 Solve the following problem by using the method of Lagrangian multiplier **(10)**

$$\text{Minimize } Z = x_1^2 + x_2^2 + x_3^2$$

Subject to

$$4x_1 + x_2^2 + 2x_3 - 14 = 0$$

$$x_1, x_2, x_3 \geq 0$$

Q7 Solve the quadratic programming problem **(10)**

$$\text{Maximize } Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$

Subject to

$$x_1 + 2x_2 + 2x_3 \leq 2$$

$$x_1, x_2 \geq 0$$

Q8 a) Use Golden search method to minimize the function **(5)**

$$f(x) = x^4 - 15x^3 + 72x^2 - 1135x$$

Terminate the search when $|f(x_n) - f(x_{n-1})| \leq 0.5$ where the initial range of x is

$$1 \leq x \leq 15$$

b) Write short notes on genetic algorithm. **(5)**