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Total number of printed pages – 3

B. Tech
HSSM 3302

Sixth Semester Regular Examination – 2014

OPTIMIZATION IN ENGINEERING

BRANCH : AUTO, CIVIL

QUESTION CODE : F 319

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
- (a) What is the difference between feasible solution and basic feasible solution ?
- (b) What is a pivot element ? How it is obtained ?
- (c) When does the simplex method indicate that the LPP has unbounded solution ?
- (d) What are the advantages and disadvantages of Big-M method ?
- (e) Write the mathematical model of Assignment problem.
- (f) Differentiate between transportation problem and assignment problem.
- (g) What do you mean by integer programming problem. ?
- (h) What are the basic characteristics of a queuing system ?
- (i) Explain Quadratic programming.
- (j) Explain genetic algorithm.

P.T.O.

2. (a) Solve the following LPP using simplex method : 5
- Minimize $Z = -3x_1 - 2x_2$
 subject to $2x_1 + 3x_2 \geq 30$;
 $3x_1 + 2x_2 \leq 24$
 $x_1 + x_2 \geq 3$
 $x_1, x_2 \geq 0$
- (b) Solve the following LPP using Big-M method : 5
- Maximize $Z = -2x_1 - x_2$
 Subject to $x_1 + x_2 = 3$
 $4x_1 + 3x_2 \geq 6$
 $x_1 + 2x_2 \leq 4$
 $x_1, x_2 \geq 0.$
3. (a) Using simplex dual method, solve the following LPP : 5
- Minimize $Z = 3x_1 + x_2$,
 subject to $x_1 + x_2 \geq 1$
 $2x_1 + 3x_2 \geq 2$
 $x_1, x_2 \geq 0.$
- (b) Using duality, solve the following LPP : 5
- Minimize $Z = x_1 + x_2$
 subject to $2x_1 + 3x_2 + 4x_3 \geq 2$
 $5x_1 + 2x_2 + x_3 = 1$
 $x_1, x_2 \geq 0$
4. Solve the following LPP using revised simplex method : 10
- Minimize $Z = x_1 + 2x_2$
 subject to $2x_1 + 5x_2 \geq 6$
 $x_1 + x_2 \geq 2$
 $x_1, x_2 \geq 0.$



5. (a) Solve the following Transportation problem having following cost matrix. 5

Source/Destination	A	B	C	D	Supply
1	19	30	50	10	7
2	70	30	40	60	9
3	40	8	70	20	18
Demand	5	8	7	14	

- (b) Find the assignment of machines to the job that will result in maximum profit. 5

Machines/jobs	A	B	C	D
1	320	350	400	280
2	400	250	300	220
3	420	270	340	300
4	250	390	410	350

6. Solve the following problem using Fibonacci search method for 5 iterations. 10

$$\text{Minimize } Z = x^3 - 2x - 5e^x$$

in the interval (0, 20)

7. Minimize $Z = (x_1 - 3)^2 + (x_2 - 4)^2$ 10

$$\text{Subject to } 2x_1 + x_2 = 3$$

using project gradient method.

8. Solve the following non-linear programming problem using Kuhn-Tucker conditions. 10

$$\text{Maximize } Z = 8x_1 + 10x_2 - x_1^2 - x_2^2$$

$$\text{Subject to } 3x_1 + 2x_2 = 6$$

$$x_1, x_2 \geq 0$$

