Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

HSSM 3302

Fifth Semester (Back / Special) Examination – 2013

OPTIMIZATION IN ENGINEERING

BRANCH : EEE, ELECTRICAL, MINERAL, MINING

QUESTION CODE : D 309

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) Define a feasible region and a feasible solution.

(b) What are slack and surplus variables ?

(c) What is degeneracy in a LPP ?

(d) Write the mathematical model of Assignment problem.

(e) Explain degeneracy in a Transportation problem and how to resolve it.

(f) Differentiate between source, sink in a Transshipment problem.

(g) What is the difference between mixed integer programming and pure integer programming ?

(h) What are the basic characteristics of a queuing system ?

(i) What is Langrage's multipliers? What is the importance of this ?

(j) Explain Kuhn – Tucker condition.

P.T.O.

2. (a) Solve the LPP using graphical method 4

Minimize $Z = -6x_1 - 4x_2$

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. 6

Minimize $Z = 4x_1 + x_2$

Subject to $3x_1 + x_2 = 50$

$4x_1 + 3x_2 \geq 24$

$x_1 + 2x_2 \leq 3$

$x_1, x_2 \geq 0.$

3. (a) Using dual Simplex method solve the following LPP 5

Maximize $Z = 5x_1 + 6x_2,$

Subject to $x_1 + x_2 \geq 2$

$4x_1 + x_2 \geq 4$

$x_1, x_2 \geq 0.$

(b) Obtain the dual problem of the following primal LP problem and solve 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. (a) Solve the following Transportation problem to maximize the profit 5

Source/Destination	A	B	C	D	Supply
1	40	25	22	33	100
2	44	35	30	30	30
3	38	38	28	30	70
Demand	40	70	60	30	

(b) Four machines are available to assign five jobs find the assignment of machines to the job that will result in maximum profit. 5

Machines/jobs	A	B	C	D	E
1	62	78	50	111	82
2	71	84	61	73	59
3	87	92	111	71	81
4	48	64	87	77	80

5. Find the optimum integer solution to the following LPP 10

Maximize $Z = 4x_1 + 3x_2$

subject to $x_1 + 2x_2 \leq 4$

$2x_1 + x_2 \leq 6$

$x_1 , x_2 \geq 0.$

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

Minimize $Z = x^3 - 2x - 5e^x$ in the interval (0 ,25)

7. Maximize $Z = x_1^2 + 2x_2^2 + x_3^2$ 10

Subject to $2x_1 + x_2 + 2x_3 = 30$,

$x_1 , x_2 \geq 0$

using Lagrange method.

8. Write short notes on the following : 5×2

(a) Project gradient method.

(b) Genetic Algorithm.