

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII EXAMINATION – WINTER 2015

Subject Code: 172503**Date:09/12/2015****Subject Name: Optimization Methods****Time: 10:30am to 1:00pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the process of LP formulation with suitable example **07**
 (b) Describe following with neat sketch **07**
 (a) Unbounded region (b) feasible region (c) Infinite region

- Q.2** (a) The manager of an oil refinery has to decide on the optimal mix of two possible blending processes. The inputs and the outputs per production run of the blending process are as follows **07**

Process	Input		Output	
	Crude A	Crude B	Gasoline G ₁	Gasoline G ₂
1	5	3	5	8
2	4	5	4	4

The maximum amounts of availability of crude A and crude B are 200 units and 150 units, respectively. Market requirements show that at least 100 units of Gasoline G₁ and 80 units of Gasoline G₂ must be produced. The profits per production run from process 1 and process 2 are Rs.3 lacs and Rs. 4 lacs respectively. Formulate this problem as a LP model to determine the number of production runs of each process such that the total profit is maximized

- (b) Solve the following problem, Using big M method **07**
 Maximize $z=4x+5y$
 Subject to $2x+3y \leq 8$
 $3x+y \geq 4$
 $x, y \geq 0$

OR

- (b) Solve the following problem using simplex method **07**
 Minimize $Z=2x+9y-4z$
 Subject to $2x+3y+4z \leq 16$
 $x+6y-4z \geq 16$
 $x, y, z > 0$

- Q.3** (a) Describe properties of Duality in detail with suitable example **07**
 (b) Construct the dual of the problem: **07**
 Maximize $Z = 3x+5y$
 Subject to $X- 2y \geq 3$
 $X + 3y \geq 9$
 $X - y \leq 5$

OR

- Q.3 (a)** There is congestion on the platform of Ahmed Railway station. The trains arrive at the rate of 30 trains per day. The waiting time for any train to flag-off is exponentially distributed with an average of 36 minutes. Calculate the following: **07**
- i) The mean queue size.
 - ii) The probability that the queue size exceeds 10.

- (b)** Describe Kendall's notations of queuing in detail **07**

- Q.4 (a)** Describe mathematical model of transportation in detail **07**
- (b)** Solve the following transportation problem **07**

Supply \ Demand	S1	S2	S3	S4	Total
D1	12	25	08	16	250
D2	23	15	18	24	150
D3	18	14	12	22	400
D4	17	20	16	26	300
	350	500	150	100	1100

OR

- Q.4 (a)** Solve following assignment problem using hungerian method **07**

Operator \ Job	P1	P2	P3	P4	P5
J1	46	54	67	78	47
J2	63	78	49	65	53
J3	62	35	68	47	63
J4	57	67	82	45	72
J5	77	64	55	69	70

- (b)** Explain travelling sales problem with suitable example **07**

- Q.5 (a)** What do you mean by saddle point? Explain with suitable example **07**
- (b)** Explain algebraic method to solve the game problem with a case problem **07**

OR

- Q.5 (a)** Describe the applications of waiting line simulation in detail **07**
- (b)** Explain inventory model of simulation with suitable case problem **07**
