Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 172503 **Date: 04/05/2017**

Subject Name: Optimization Methods

Time: 02:30 PM to 05:00 PM **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) A transistor radio company manufactures models A,B and C which have profit contributions of 8, 15 and 25 respectively. The weekly minimum production requirements are 100 for model A, 150 for model B and 75 for model C. Each type of radio requires a certain amount of time for the manufacturing of component parts, for assembling and packing. Specially a dozen units of model A require three hours of manufacturing, four hours of assembling and one hour of packing. The corresponding figures for a dozen units of model B are 3.5, 5 and 1.5 and for a dozen unit of model C are 5, 8 and 3. During the forthcoming week the company has available 150 hours of manufacturing, 200 hours of assembling and 60 hours of packing time. Formulate the production scheduling problem as a linear programming model. **07**

(b) Solve graphically: **07**

Maximize $Z = 2X1 + 3X2$

Subject to the constraints

$X1+X2 \leq 30$

$X2 \geq 3$

$X2 \leq 12$

$X1 - X2 \geq 0$

$X1, X2 \geq 0$

Q.2 (a) Solve using Simplex Method **07**

Maximize $Z = 40X1 + 80X2$

Subject to the constraints

$2X1+3X2 \leq 48$

$X1 \leq 15$

$X2 \leq 10$

$X1, X2 \geq 0$

(b) Compare simplex method and dual simplex method. **07**

OR

(b) Convert the problem given in question 2 (a) in to dual and discuss its properties **07**

Q.3 (a) Solve the following assignment problem: **07**

	I	II	III	IV	V
A	1	3	2	3	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

(b) Explain mathematical model for assignment problem. **07**

OR

Q.3 (a) Explain initial feasible methods for solving transportation problem **07**

(b) Describe transshipment problem with a case study **07**

Q.4 **(a)** What are the steps involved in the solution of (2 x n) and (m x 2) games. **07**

(b) Solve the following (4 x 2) game. **07**

		B	
		I	II
	I	2	4
A	II	2	3
	III	3	2
	IV	2	6

OR

Q.4 **(a)** Give essential characteristics of queuing procedure: **07**

(b) At a railway station, only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hour and the railway station can handle them on an average of 12 per hour. Assuming Poisson arrivals and exponential service distribution, find the steady-state probabilities for the various number of trains in the system. Also find the average waiting time for a new train coming into the yard. **07**

Q.5 Explain Inventory model of simulation with suitable case problem **14**

OR

Q.5 At a service station a study was made over a period of 25 days to determine both the number of automobiles being brought in for service and the number of automobiles serviced. The results are given below. **14**

No. of automobiles arriving and serviced :	0	1	2	3	4	5
Frequency of arrivals (days) :	2	4	10	5	3	1
Frequency of daily serviced (days) :	3	2	12	3	4	1

Simulate the arrival/service pattern for a 15 day period and estimate the mean number of automobiles that remain in service for more than a day.

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