# **GUJARAT TECHNOLOGICAL UNIVERSITY**

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

Subject Code: 172503

**Subject Name: Optimization Methods** 

Time: 02:30 PM to 05:00 PM

# 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.
  - (b) Solve graphically: Maximize Z = 2X1 + 3X2Subject to the constraints  $X1+X2 \leq 30$   $X2 \geq 3$   $X2 \leq 12$  $X1 - X2 \geq 0$
- Q.2 (a) Solve using Simplex Method Maximize Z = 40X1+80X2Subject to the constraints  $2X1+3X2 \le 48$  $X1 \le 15$  $X2 \le 10$  $X1,X2 \ge 0$

**Q.3** 

 $X1, X2 \ge 0$ 

(b) Compare simplex method and dual simplex method.

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- (b) Convert the problem given in question 2 (a) in to dual and discuss its properties
  (a) Solve the following assignment problem:
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  - Ι Π Ш IV V 1 3 2 3 Α 6 2 4 3 В 1 5 5 С 6 3 4 6 2 D 3 1 4 2 E 1 5 6 5 4
- (b) Explain mathematical model for assignment problem.

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- OR
- Q.3 (a) Explain initial feasible methods for solving transportation problem
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# **Total Marks: 70**

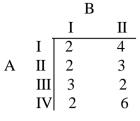
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- (b) Describe transshipment problem with a case study
- **Q.4** (a) What are the steps involved in the solution of  $(2 \times n)$  and  $(m \times 2)$  games.
  - (b) Solve the following  $(4 \times 2)$  game.



### OR

- Q.4 (a) Give essential characteristics of queuing procedure:
  - (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.
- Q.5 Explain Inventory model of simulation with suitable case problem

#### OR

At a service station a study was made over a period of 25 days to determine Q.5 14 both the number of automobiles being brought in for service and the number of automobiles serviced. The results are given below. No. of automobiles arriving and serviced : 0 2 3 4 5 1 Frequency of arrivals (days) 5 3 1 : 2 4 10 Frequency of daily serviced (days) 3 2 3 12 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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