Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 172004 **Date: 25/11/2016**

Subject Name: Production Optimization Techniques

Time: 10:30 AM to 01:00 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)** Explain the characteristics, assumptions and applications of linear programming. **07**

(b) A company has two grades of inspectors 1 & 2 who are to be assigned for a quality control inspection. It is required that atleast 2000 pieces be inspected per 8 hour day. Grade 1 inspector can check pieces at a rate of 40/hour with an accuracy of 97%. Grade 2 inspector checks at a rate of 30 pieces/hour with an accuracy of 95%. Wage rate of grade 1 inspector is Rs.5 per hour while that of Grade 2 inspector is Rs. 4 per hour. An error made by an inspector costs Rs.3 to the company. There are only 9 grade 1 and 11 grade 2 inspectors available. The company wishes to assign work to the available inspectors so as to minimize total cost of inspection. Formulate an LP model. **07**

Q.2 **(a)** (i) Evaluate "PERT is used for recurring type of projects whereas CPM is used for nonrecurring type". **07**

(ii) A time study is conducted on the performance of four jobs by four men. Expressed in terms of departures from a standard time allowance for each job, the results are :

JOBS

PEOPLE

	1	2	3	4
1	9	4	15	2
2	4	-1	10	-3
3	3	-2	9	- 4
4	7	2	13	0

Find the optimum schedule(s) and value of the objective function and comment on the results.

(b) Justify the following **07**

i. The "Transportation Technique" though faster than Linear Programming technique has limited applications in the solution of production problems.

ii. The final assignment matrix of an assignment problem arrived at by using the Hungarian model, indicates the existence of alternative strategies.

OR

(b) Explain the similarity and difference between Transportation and an Assignment problem. What problems will be faced if an assignment problem is solved using transportation technique? Explain giving suitable example. **07**

Q.3 **(a)** Explain the existence of Infeasible solution, Unbounded solution, and Multiple optimum solutions in case of Simplex method and Graphical method. **07**

(b) A company has three production centres and two regional offices. The **07**

availability, requirements and the shipping costs are as shown in the table below.

Region / Centre	R1	R2	Capacity
C1	40 / 5	60 / 8	100
C2	/ 9	160 / 6	160
C3	80 / 5	/ 10	80
Requirement	120	220	

The company's marketing department if flooded with complaints of unsatisfactory service from the customers in the second region. The company is considering the breaking up of this region into two and establishing sales offices separately to improve the services of customer orders. The shipping costs to the new region office (R3) from production centers C1, C2 and C3 is estimated to be Rs. 5, Rs. 7 and Rs. 6 respectively. The opening of the new regional office R3 is expected to reduce the requirements of R2 to 110 and hence R3 to 110. Determine the optimum shipping schedule and cost before and after the breakup of region R2.

OR

Q.3 **(a)** Explain the Johnsons rule of sequencing with suitable example. How a sequencing problem is different from Assignment Problem? **07**

(b) What do you understand by Float? Explain the different types of float and their significance. **07**

Q.4 **(a)** What is the need of Decision tree analysis? **07**
Also explain the following :

- Hurwicz criterion
- Minimax principle
- Decision making under risk and uncertainty.

(b) Differentiate PERT & CPM as network analysis techniques. Under what conditions use of each technique is preferable as an individual. **07**

OR

Q.4 **(a)** Explain the need of Crashing, Resource leveling and Resource smoothing with suitable example **07**

(b) **07**

Q.5 **(a)** Define the following **07**
(1) Balking
(2) Reneging
(3) Jockeying.

(b) Discuss briefly about the different types of inventory and various costs involved in inventory problems. **07**

OR

Q.5 **(a)** Explain the following related to a Queuing system **07**

i. Queue Discipline
ii. SIRO
iii. FIFO
iv. Kendall's notation

(b) Explain the need of replacement clearly indicating the significance of Individual and Group replacement. **07**

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