Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:3152008 Date:27/01/2021

Subject Name:Production Optimization Techniques

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	What is the modern approach to management? What are the four major approaches to the study of management?	**03**
	(b)	Discuss the importance of Primal and Dual problem along with Sensitivity Analysis in Linear programming?	**04**
	(c)	In this problem, a patient visits the doctor to get treatment for ill health. The doctor examines the patient and advises him to consume **at leas**t 40 units of vitamin *A* and 50 units of vitamin *B* daily for a specified time period. He also advises the patient that to get vitamin *A* and vitamin *B* he has to drink tonic *X* and tonic *Y* that have both vitamin *A* and vitamin *B* in a proportion. One unit of tonic *X* consists 2 units of vitamin *A* and 3 units of vitamin *B* and one unit of tonic *Y* consists of 4 units of vitamin *A* and 2 units of vitamin *B*. These tonics are available in medical shops at a cost of Rs.3.00 and Rs.2.50 per unit of *X* and *Y* respectively. Now the problem of patient is how much of *X* and how much of *Y* is to be purchased from the shop to minimize the total cost and at the same time he can get required amount of vitamins *A* and *B*.	**07**
Q.2	**(a)**	What is an Operations Research model? Discuss the advantages of limitation of good Operations Research model	**03**
	(b)	A Transportation problem cannot be solve using simplex method – Evaluate.	**04**
	(c)	What is the logic of introducing an artificial variable in a simplex Table? Describe the two phase process of solving an LPP by simplex method. Why is a Solution containing an artificial variable considered as an infeasible solution?	**07**
Q.3	**(a)**	Differentiate between CPM and PERT techniques.	**03**
	(b)	Explain the techniques of assigning different wok to operators. Discuss the steps involving in Hungarian method	**04**

(c) A small project has 7 activities and the time in days for each activity is given below: **07**

Activity	Duration in days
A	6
B	8
C	3
D	4
E	6
F	10
G	3

Given that activities *A* and *B* can start at the beginning of the project. When *A* is completed *C* and *D* can start. *E* can start only when *B* and *D* are finished. *F* can start when *B, C* and *D* are completed and is the final activity. *G* can start when *E* is finished and is the final activity. Draw the network and find the project completion time.

Activity	Immediate predecessor	Time in days
A	-	6
B	-	8
C	A	3
D	A	4
E	B,D	6
F	B,C or D	10
G	E	3

Q.4 **(a)** Explain the significance and types of floats used in network analysis. **03**

(b) Explain the techniques used for solving a transportation problem. **04**

(c) Differentiate between the following terms: **07**

(1) Logical and Identity Dummy
(2) Earliest starting time (EST) & Latest starting time (LST)
(3) Earliest finishing time (EFT) & Latest finishing time (LFT)
(4) Merge and Burst event

Q.5 **(a)** Comparison between transportation problem and Assignment problem **03**

(b) Define and explain the significance of slack variable and surplus variable. **04**

(c) A manager has 4 jobs on hand to be assigned to 3 of his clerical staff. Clerical staff differs in efficiency. The efficiency is a measure of time taken by them to do various jobs. The manager wants to assign the duty to his staff, so that the total time taken by the staff should be minimum. The matrix given below shows the time taken by each person to do a particular job. Help the manager in assigning the jobs to the personnel. **07**

Job	Men (time taken to do job in hours).		
	X	Y	Z
A	10	27	16
B	14	28	7
C	36	21	16
D	19	31	21

Q.6 **(a)** What is a decision? Differentiate between programmed and non-programmed decisions. **03**

(b) Explain the application of sequencing model. Mention different types of sequencing problem you come across. **04**

(c) Explain the conditions required to satisfy when you want to convert a 3-machine problem into 2- machine problem. **07**

Q.7 **(a)** Explain the assumption made in solving sequencing problem **03**

(b) Describe the steps in decision theory approach **04**

(c) Five jobs are to be assigned to 5 machines to minimize the total time required to process the jobs on machines. The times in hours for processing each job on each machine are given in the matrix below. By using assignment algorithm make the assignment for minimizing the time of processing. **07**

Jobs	V	W	X	Y	Z
A	2	4	3	5	4
B	7	4	6	8	4
C	2	9	8	10	4
D	8	6	12	7	4
E	2	8	5	8	8

Q.8 **(a)** Explain the concept of 'Expected Value of Perfect Information' in context of Decision theory. **03**

(b) How profit maximization problem can be solved by assignment Problem? **04**

(c) There are seven jobs, each of which has to be processed on machine *A* and then on Machine *B* (order of machining is *AB*). Processing time is given in hours. Find the optimal sequence in which the jobs are to be processed so as to minimize the total time elapsed. **07**

JOB:	1	2	3	4	5	6	7
Machine: A:(time in hours).	3	12	15	6	10	11	9
Machine: B:(time in hours).	8	10	10	6	12	1	3

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