Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (Old) EXAMINATION – WINTER 2019

Subject Code: 161601 Date: 16/12/2019

Subject Name: Modelling Simulation And Operations Research

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)** Explain Simulation with real life examples? **07**

(b) What is operation research? Explain different phases of OR? **07**

Q.2 **(a)** List the various replacement policies? Explain all with suitable example? **07**

(b) Explain simplex and Dual method with example? **07**

OR

(b) Consider the production planning of the Super Fast Manufacturing Company which makes items P and V. The Steel requirement for P is 400gm per piece and that for V is 350gm per piece. Both P and V, are machined on Lathe which takes 85 and 50 minutes respectively, and are processed on a Grinder which requires 55 and 30 minutes respectively. Each unit of P consumes 20 minutes of Polishing time. The resource availability is: Total Machine Time is 1,450 hours and Total Steel is 250 kg. 30% of total machine time is that of Lathe, 50% of grinder and the remaining of polishing. Unit contribution to profits for P and V is Rs 40 and Rs 30 respectively. Formulate this as a Linear Programming model for determining the number of units of P and V to be produced which would maximize the profits. Given also is the constraints that the company cannot sell more units of item P than of item V. **07**

Q.3 **(a)** A retired person wants to invest upto an amount of Rs 30,000 in fixed income securities. His broker recommends investing in two bonds: Bond A yielding 7% and Bond B yielding 10%. After some consideration, he decided to invest at most Rs 12,000 in Bond B and at least Rs 6,000 in Bond A. He also wants the amount invested in Bond A to be at least equal to the amount invested in Bond B. what should the broker recommend if the investor wants to maximize his return on investment? Solve graphically? **07**

(b) Solve the following LPP : **07**

Maximize $Z=6P + 20Q$

Subject to, $2P + Q \leq 32$

$3P + 4Q \leq 80$

$P \geq 8$

$Q \geq 10$

OR

Q.3 **(a)** Explain CPM and PERT with suitable example? **07**

(b) What is Queuing system? Analyse hospital system as queuing system? **07**

Q.4 **(a)** Write the dual of the following LPP: **07**

Minimise $Z = 10P + 20Q$

Subject to, $3P + 2Q \geq 18$

$P + 3Q \geq 8$

$2P - Q \leq 6$ and $P, Q \geq 0$

(b) Draw the network diagram and find critical path, earliest start and earliest finish time of each activity of given project? **07**

Activity	1-2	1-3	1-4	2-6	3-5	4-5	4-8	5-7	6-7	7-8
Duration (Days)	3	2	6	4	2	1	4	3	2	4

OR

Q.4 **(a)** What is Monte Carlo simulation? Write advantages and disadvantages of simulation? **07**

(b) Solve the following problem using North-West Corner transportation method. **07**

To:	P	Q	R	S	Supply
From A:	12	10	12	13	500
From B:	7	11	8	14	300
From C:	6	16	11	7	200
Demand	180	150	350	320	1000

Q.5 **(a)** Determine the optimum replacement interval of an equipment which costs of Rs 5,200 and whose resale values and running costs are as follows: **07**

Year	1	2	3	4	5	6	7
Resale Values	3,500	2,700	1,800	1,000	850	600	425
Running Cost	600	850	1,000	1,250	1,400	1,475	2,000

(b) What is replacement problem? Describe some important replacement situations and policies? **07**

OR

Q.5 **(a)** Explain Lease Cost method with suitable example. **07**

(b) Solve the following problem with Hungarian assignment method: **07**

	S1	S2	S3	S4	S5
B1	4	6	7	5	11
B2	7	3	6	9	5
B3	8	5	4	6	9
B4	9	12	7	11	10
B5	7	5	9	8	11

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