

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
