

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- VIth SEMESTER-EXAMINATION – MAY- 2012****Subject code: 161601****Date: 17/05/2012****Subject Name: Modeling Simulation and Operations Research****Time: 10:30 am – 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) Define Operation Research. Write Characteristics and limitation of Operation Research. 07

(b) Define (1) C.P.M (2) L.P.P 03

(C) A firm manufacture 3 Products A,B and C. The Profits are Rs.3, Rs.2, and Rs.4 respectively. The firm has two machine C and D which requires processing time 4,3,6 and 3,2,4 minutes respectively on each machine for each product. Machine C and D have 2000 and 2500 machine minutes, respectively. The firm must manufacture 100 A's, 200 B's and 500 C's, but not more than 150 A's. Set up linear programming Problem to maximize the profit. 04

Q.2 (a) A manufacture of furniture makes two products chairs and tables. Processing these Products is done on two machine A and B. A chair requires 2 hours on machine A and 6 hours on Machine B. A table requires 5 hours on Machine A and No time on machine B. There are 16 hours of time per day available on Machine A and 30 hours on Machine B. Profit gained by the manufacturer from a Chair and a table is Rs 2 and Rs 10 respectively. Solve this problem graphically to maximize the profit. 07

(b) Use simplex method to solve following LPPs 07

$$\text{Maximize } Z = 3X_1 + 2X_2$$

$$\text{Subject to } X_1 + X_2 \leq 4, X_1 - X_2 \leq 2, X_1 \geq 0 \text{ and } X_2 \geq 0$$

OR

(b) Explain BIG-M Method with suitable example. 07

Q.3 (a) (i) Describe the Transportation problem and give its mathematical model. 03

(ii) Write a note on tracing a closed loop. What are the Characteristics features of a closed loop. 04

(b) Solve the transportation problem (find initial basic solution with VAM and Optimal Solution using MODI method) 07

	D1	D2	D3	D4	Supply
S1	21	16	25	13	11
S2	17	18	14	23	13
S2	32	27	18	41	19
Demand	6	10	12	15	

OR

Q.3 (a) What is an assignment model ? Explain difference between a transportation and an assignment problem 07

- (b) Find the Optimal solution for the following assignment Problem.

07

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

- Q.4 (a) Define PERT. What is Critical Path ?

07

Explain Difference between C.P.M and P.E.R.T.

- (b) A firm is considering replacement of machine whose cost price is Rs.12,200 and scrap value is Rs.200. The maintenance cost are as follows :

Year	1	2	3	4	5	6	7	8
Main. Cost	200	500	800	1200	1800	2500	3200	4000

OR

- Q.4 (a) What is a replacement problem ? Describe some important replacement situation. Also discuss group replacement problem.

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- (b) Consider the following data for the activity of the project:

07

Activity	A	B	C	D	E	F
Imm.Pre	-	A	A	B,C	-	E
Duration	2	3	4	6	2	8

Draw the network and find Forward and backward pass and find the critical path.

- Q.5 (a) What is simulation ? What are the advantages and limitations of simulation.

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- (b) What is queue ? Explain basic element of queues. Give some application of queuing theory.

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OR

- Q.5 (a) Explain the phases of a simulation model.

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- (b) A self service store employs one cashier at its counter. An average of nine customers arrive every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find

07

- Avg. number of customer in the system.
- Avg. number of customer in queue or average queue length.
- Avg. time a customer spends in the system.
- Avg. time a customer waits before being served.
