Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER 2013

Subject Code: 172503 Date: 28-05-2013

Subject Name: Optimization Methods

Time: 02.30 pm - 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 steps to develop LP model and basic assumption made under formulation of LP model **07**

(b) A firm manufactures two types of product, A and B and sells them at a profit of Rs 4 and 6 respectively. Each product is processed on two machines M and N. Type A requires five minute of processing time on M and ten minutes on N; type B requires five minute on M and five minute on N. The machine M is available for not more than 8 hours while machine N is available for 10 hours during any working day. Formulate the problem and solve with graphical method **07**

Q.2 **(a)** Solve following problem using simplex method

Max $4X_1+10X_2$

Subject to $2X_1+X_2 \leq 50$

$2X_1+5X_2 \leq 100$

$2X_1+3X_2 \leq 90$

$X_1, X_2 \geq 0$

(b) Explain following terms using graph **07**

1. Feasible region 2. Unbounded region 3. Infeasible region
4. Multiple solution

OR

(b) Convert following problem as dual and solve it. **07**

Max $2X_1+X_2$

Subject to $X_1+2X_2 \leq 10$

$X_1+X_2 \leq 6$

$X_1- X_2 \leq 2$

$X_1- 2X_2 \leq 1$

$X_1, X_2 \geq 0$

Q.3 **(a)** What do you mean by transshipment? Explain in detail with suitable example **07**

(b) Solve following transportation problem **07**

From\To	A	B	C	D	SUPPLY
1	11	20	7	8	50
2	21	16	20	12	40
3	8	12	8	9	70
DEMAND	30	25	35	40	

OR

Q.3 A company has factories at four different places which supply to warehouses A,B,C,D and E. Monthly factory capacities are 200,175,150 and 325, respectively. Monthly warehouse requirements are 110,90,120,230 and 160, respectively. The transport cost are given **14**

in the table

From\To	A	B	C	D	E
1	13	-	31	8	20
2	14	9	17	6	10
3	25	11	12	17	15
4	10	21	13	-	17

Shipment from 1toB and from 4toD is not possible. Find the optimal Solution.

Q.4 Distance between six islands (vice-versa) in the Indian Ocean are given in the table **14**

	A	B	C	D	E	F
A	-	120	90	100	110	160
B		-	190	200	210	270
C			-	30	40	90
D				-	30	80
E					-	70
F						-

It is proved to lay submarine cable of smallest length to connect all the islands by telephone connections. Find the minimum spanning tree for the six islands mentioned.

OR

Q.4 **(a)** Explain algebraic method in detail to solve the game problem having no saddle point with suitable example. **07**

(b) Solve following game problem using any method **07**

	Player A			
Player B		B1	B2	B3
	A1	1	7	2
	A2	6	2	7
	A3	5	1	6

Q.5 **(a)** 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**

1. Average number of customer in the system
2. Average number of customers in queue or average queue length
3. Average time a customer spends in the system.
4. Average time a customer waits before being served.

(b) Describe kendall's notations in detail with characteristics. **07**

OR

Q.5 **(a)** A tourist car operator finds that during the past few months the car's use has varied so much that the cost of maintaining the car has varied considerably. During the past 200 days the demand for the car fluctuated as below. **10**

Trips/ Week	0	1	2	3	4	5
Freq.	16	24	30	60	40	30

Using random number simulate the demand for 10 week period.

(b) Explain applications of simulation over other models and its limitations in detail. **07**

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