Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER– IV • EXAMINATION – SUMMER 2014

Subject Code:640003 Date:03/06/2017

Subject Name: Operation Research

Time:10.30 AM TO 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)** (I) Define: **04**

1) Infeasible Solution 2) Unbounded Solution

(II) Explain types of events with reference of PERT/CPM. **03**

(b) Discuss Monte Carlo Simulation Method. **07**

Q.2 **(a)** (I) Define: Two-Person Zero Sum Game with example **02**

(II) For what value of Y, the game with following pay-off matrix is strictly determinable? **05**

		Player B		
Player A		B_1	B_2	B_3
	A_1	Y	6	2
	A_2	-1	Y	-7
	A_3	-2	4	Y

(b) Solve following LPP using Simplex Method: **07**

Max Z = a + 4b + 5c
Subject to,

3a + 3b <= 22, a + 2b + 3c <= 14, 3a + 2b <= 14

And a, b, c >= 0

OR

(b) Write dual of following LPP: **07**

Min Z = x + y + z
Subject to,

x – 3y + 4z = 5, x – 2y <= 3, 2y – z >= 4

And x, y >= 0, z is unrestricted

Q.3 **(a)** Customers arrive at a box office window, being manned by a single individual, according to a Poisson input process with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 90 seconds. **07**

i. Find expected number of customers in a system.
ii. Find queue length.

(b) Solve following assignment problem: **07**

		Jobs			
Worker		A	B	C	D
	1	45	40	51	67
	2	57	42	63	55
	3	49	52	48	64
	4	41	45	60	55

OR

Q.3 **(a)** Find initial feasible solution for given transportation problem using VAM: **07**

		Distribution Centre				Supply
Plant		D_1	D_2	D_3	D_4	
	P_1	20	30	110	70	6
	P_2	10	0	60	10	1
	P_3	50	80	150	90	10
Demand		7	5	3	2	

(b) Define: Queue & Discuss dynamic queue discipline in detail. **07**

Q.4 **(a)** Draw a network diagrams for the following: **07**

i)

Activity	Predecessor Activity
A	--
B	--
C	--
D	A
E	B
F	B, C
G	D, E, F
H	E, F

ii)

Activity	Predecessor Activity
A	--
B	--
C	--
D	A
E	A, B
F	A, B, C
G	D, E, F
H	F

(b) A manufacturer has to supply his customer with 600 units of his product per year. Shortages are not allowed and the storage cost amounts to Rs. 0.60 per unit per year. The set-up cost per run is Rs. 80. Find the optimum run size, the minimum average yearly cost and optimum order cycle time. **07**

OR

Q.4 **(a)** A pipeline is due for repairs. The repair would cost Rs. 10,000 and would last for three years. Alternatively, a new pipeline can be laid at a cost of Rs. 30,000, which would for 10 years. Assuming the cost of capital to be 10% and ignore salvage value, which alternative should be adopted? **07**

(b) Use the graphical method to minimize the time needed to process the following jobs on the machines shown, i.e. for each machine find the job that should be done first. Also, calculate the total elapsed time to complete both jobs. **07**

		Machines				
Job 1	Sequence:	A	B	C	D	E
	Time(Hrs.)	3	4	2	6	2

		Machines				
Job 2	Sequence:	B	C	A	D	E
	Time(Hrs.)	5	4	3	2	6

Q.5 **(a)** Discuss errors and dummies in network with suitable example. **07**

(b) What is rim condition? Write & explain general mathematical model of transportation problem. **07**

OR

Q.5 **(a)** An aircraft company uses rivets at a constant rate of 2500 per year. Each unit costs Rs. 30. The company personnel estimate that it costs Rs. 130 to place an order, and that the carrying cost of inventory is 10% per year. How many numbers of orders be placed for the time period? Determine the optimum size of each order. **07**

(b) Solve given transportation problem using LCM: **07**

		Destination				Supply
Source		D_1	D_2	D_3	D_4	
	S_1	11	13	17	14	250
	S_2	16	18	14	10	300
	S_3	21	24	13	10	400
Demand		200	225	275	250	

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