GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VII EXAMINATION - SUMMER 2016

Subject Code:173405 Date:05/05/2016 Subject Name: Operations Research (Department Elective – I) 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** What are the phases of Operation Research? Discuss in brief the application of 07 (a) Operation Research. 07
 - (b) Solve the following game by using Dominance method

	Player B				
		B_1	B_2	B ₃	
Player A	A_1	4	5	8	
	A_2	6	4	6	
	A ₃	4	2	4	

- Q.2 (a) Solve the following LPP by simple method : 07 Maximize $Z = 3x_1 + 2x_2$ subject to $2x_1 + x_2 \le 5$, $x_1 + x_2 \le 3$ and x_1 and $x_2 > 0$ 07
 - (b) What do you mean by linear programming? Define following terms : linear function, objective function, decision variable, constraints, feasible solution, optimal solution.

OR

(b) The captain of cricket team has to allot five middle batting positions to five 07 batsmen. The average runs scored by each batsman at these positions are as follows:

Batsmen	Batting position							
	Ι	II	III	IV	V			
А	40	40	35	25	50			
В	42	30	16	25	27			
С	50	48	40	60	50			
D	20	19	20	18	25			
E	58	60	59	55	53			

Find the assignments of batsmen to positions which would give the maximum number of runs.

- (a) What do you mean by Inventory? What are the various prices associated with Q.3 07 Inventory? Write a brief note on various Inventory control techniques.
 - (b) Minimize $z = -3x_1 + x_2 2x_3$, Subject to $x_1 + 3x_2 + x_3 < 5$ $2x_1 - x_2 + x_3 \ge 2$ $4x_1 + 3x_2 - 2x_3 = 5$ $x_1, x_2, x_3 \ge 0$

OR

(a) The annual demand of a product is 15,000 units. Each unit cost Rs.50/- if the 07 Q.3

07

orders are placed in quantity below 150 units. For order of 200 and above the unit prize is Rs.44/-. Assume inventory holding cost is 12% of the value of item and ordering cost is Rs.2/- per order find the economic lot size

- (b) Distinguish between PERT and CPM.
- Q.4 (a) The following table indicates the details of a project. The durations are in days.
 O' refers to optimistic time, 'm' refers to most likely time and 'p' refers to pessimistic time duration.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
0	1	1	2	1	2	2	3
m	1	4	2	1	5	5	6
р	7	7	8	1	14	8	15

a) Draw the network and

b) What is the expected project length and standard deviation?

(b) The cost of the machine is Rs 12200 and its scrap value is Rs. 200. The 07 maintenance costs found from experience are as follows:

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

When should the machine be replaced?

OR

Q.4 (a) Find optimum solution of the following transportation problem:

	D_1	D_2	D ₃	D_4	Supply
\mathbf{S}_1	5	2	4	3	60
\mathbf{S}_2	6	4	9	5	60
S ₃	2	3	8	1	90
Demand	50	65	65	30	

(b) Find out optimum solution for following basic feasible solution

	1	2	3	4	5	Supply
А	40(10)	30	10(30)	20(40)	60	80
В	50	20(60)	30	40	50	60
С	30(30)	50	60	30	20(10)	40
D	20(20)	40	40	50	30	20
Demand	60	60	30	40	10	200

Q.5 (a) Customers arrive at a one window drive according to the poisons distribution 07 with the mean of 10 minutes and service time per customer is exponential with mean of 6 minutes. The space in front of the window can accommodate only three vehicles including the serviced one. Other vehicles have to wait outside the space. Calculate:

- Probability that an arriving customer can drive directly to the space in front of the window

- Probability that an arriving customer will have to wait outside directed space

- How long an arriving customer is expected to wait before getting the service?
- (b) Explain the unique characteristics of dynamic programming.

OR

Q.5 (a) A coffee maker has one coffee making machine and he operates as the order

07

07

07

07

comes. The order arrival is Poisson distribution having inter-arrival time of 0.5 minute. The average time to serve a coffee is distributed with mean of 0.3 minute. Determine the following:

- 1) Utilization factor of machine
- 2) Idle time for machine in a day having working hour of 10 hours
- 3) Number of persons waiting in the system
- 4) Number of persons waiting in the queue
- 5) Average waiting time in the queue
- 6) Total time spent in the system
- 7) Penalty cost of the waiting time is Rs. 60 per hour
- (b) What are the advantages and limitations of simulation? Explain Monte Carlo 07 simulation procedure.
