GUJARAT TECHNOLOGICAL UNIVERSITY BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016

Subject Code: 161601Date: 27/10/2016Subject Name: Modelling, Simulation and OperationsResearchTime: 02:30 PM to 05:00 PMTotal Marks: 70Instructions:Total Marks: 70

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Give any two definitions of Operations Research. Describe methodology of 07 Operations Research.
 - (b) (1) Discuss the following terms:
 - slack variable
 - artificial variable
 - (2) A firm manufactures two products P and Q, both of which have to be processed on two machines M₁ and M₂. Product P requires 4 hours each on both machines, while product Q requires 6 hours on machine M₁ and 2 hours on machine M₂. The available hours on machines M₁ and M₂ are 24 and 16 respectively. The profit per unit is estimated at Rs 120 for product P and Rs 130 for product Q. Formulate this problem as linear programming model to maximize profit.

Q.2 (a) List and explain rules for PERT/CPM network construction. 07

(b) Obtain initial feasible solution for the following transportation problem using 07 Vogel's Approximation Method.

	Р	Q	R	S	Supply
А	12	10	12	13	500
В	7	11	8	14	300
С	6	16	11	7	200
Demand	180	150	350	320	

OR

(b) Solve the following LPP using simplex method.

Maximize Z = 11x + 4ysubject to $7x + 6y \le 84$ $4x + 2y \le 32$, and $x \ge 0$, $y \ge 0$

Q.3 (a) Discuss the limitations of graphical method to solve linear programming 07 problem. Apply graphical method for the following : Maximize z = 100x + 125ySubject to $4x + 6y \le 24$ $4x + 2y \le 16$ $x \ge 0, y \ge 0$

07

03

(b) Solve the following assignment problem using Hungarian Assignment Method. 07

	Job					
Worker	А	В	С	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) Use two phase method to solve the following LPP:

 $\begin{array}{l} \mbox{Minimize } Z = 5x + 3y \\ \mbox{subject to} \\ 2x + y \leq 1 \end{array}$

$$x + 4y \ge 6$$

$$x \ge 0 \text{ and } y \ge 0$$

(b) Draw a network corresponding the following information. Obtain the early and 07 late start and completion times.

Activity	1-2	1-3	2-6	3-4	3-5	4-6	5-6	5-7	6-7
Duration	4	6	8	7	4	6	5	19	10

(a)	Discuss any algorithm to find minimum spanning tree for a given graph.			
(b)	Write a note on resource smoothing and allocation.			
	OR			
(a)	Discuss the types of queuing system with six-character code in detail.	07		
(b)	(1) Briefly explain birth and death process in concerned with queuing system.	03		
	(2) What is unbalanced transportation problem? Explain the same in brief.	04		
(a)	(1) State the advantages and disadvantages of simulation.	04		
	(2) Write a note on : random number generation	03		
(b)	Write the basic elements of queuing system. Also write the applications of	07		
	queuing system and explain the same.			
	OR			
(a)	Explain the general structure of queuing system.	07		
(b)	Write a note on : group vs. individual replacement policies	07		
	 (a) (b) (a) (b) (a) (b) 	 (a) Discuss any algorithm to find minimum spanning tree for a given graph. (b) Write a note on resource smoothing and allocation. OR (a) Discuss the types of queuing system with six-character code in detail. (b) (1) Briefly explain birth and death process in concerned with queuing system. (2) What is unbalanced transportation problem? Explain the same in brief. (a) (1) State the advantages and disadvantages of simulation. (2) Write a note on : random number generation (b) Write the basic elements of queuing system. Also write the applications of queuing system and explain the same. OR (a) Explain the general structure of queuing system. (b) Write a note on : group vs. individual replacement policies 		

07