Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2132905 **Date: 13/06/2017**

Subject Name: Basic Engineering in Textile

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.**

MARKS

Q.1 **Short Questions** **14**

1 Define Method Study.
2 Define work measurement technique.
3 Define Standard time.
4 Define Basic Time.
5 What is feasibility region?
6 What is redundant constraint?
7 What is dummy activity?
8 What is critical path?
9 What is the concept of Float?
10 What is the function of Boiler?
11 What do you mean by maintenance?
12 Define degree of saturation.
13 Define Dry bulb temperature.
14 Define Humidity Ratio.

Q.2 **(a)** Solve graphically: **03**

Maximize $Z = 10X_1 + 15X_2$

Subject to $2X_1 + X_2 \leq 26$

$2X_1 + 4X_2 \leq 56$

$X_1 - X_2 \geq -5$

$X_1, X_2 \geq 0$

(b) Explain the phenomenon of "Infeasibility" in a linear programming problem. What are the indicators of such a phenomenon? How can it be handled? **04**

(c) The marketing department of Everest company has collected information on the problem of advertising for its products. This relates to the advertising media available, the number of families expected to be reached with each alternatives, cost per advertisement, the maximum availability of each medium and the expected exposure of each one (measured as the relative value of one advertisement in each of the media). **07**

The information is given below:

Advertising Media	No. of families expected to cover	Cost per Ad (Rs)	Maximum availability (No. of times)	Expected exposure (Units)
TV (30 Sec)	3000	8000	8	80
Radio (15 Sec)	7000	3000	30	20
Sunday edition of a daily (1/4 Page)	5000	4000	4	50
Magazine (1 Page)	2000	3000	2	60

Other information and requirements:

(a) The advertising budget is 70,000/-

(b) At least 40,000 families should be covered (the families receiving

messages could be common. But a family receiving three messages, for example would be taken to be equivalent to three)

(c) At least 2 insertions be given in Sunday edition of a daily but not more 4 ads should be given on the TV.

Draft this as linear programming problem. The company's objective is to maximize the expected exposure.

OR

(c) A firm uses three machines in the manufacturing of three products. Each unit of product **A** requires 3 hours of machine **I**, 2 hours on machine **II** and one hour on machine **III**. Each unit of product **B** requires 4 hours of machine **I**, one hour on machine **II** and 3 hours on machine **III**, while each unit of product **C** requires 2 hours on **each** of the machines. The contribution margin of the three products is Rs 30, Rs 40 and Rs 35 per unit respectively. The machine hours available on three machines are 90, 54, and 93 respectively. **07**

(a) Formulate the above problem as linear programming problem.

(b) Obtain optimal solution to the problem by using Simplex method. Which of the three products shall not be produced by the firm? Why?

Q.3 (a) Solve the following transportation problem for **Maximum Profit.** **03**

		Market			
		A	**B**	**C**	**D**
Warehouse	**X**	12	18	6	25
	Y	8	7	10	18
	Z	14	3	11	20

Availability at Warehouses:	Demand in the Market
X : 200 Units	A : 180 Units
Y : 500 Units	B : 320 Units
Z : 300 Units	C : 100 Units
	D : 400 Units

(b) A Company has three Plants and four Warehouses. The supply and demand in units and the corresponding transportation costs are given. **04**

Plants	**Warehouse**				**Supply**
	I	II	III	IV	
A	5	10	10 4	5	10
B	20 6	8	7	5 2	25
C	5 4	10 2	5 5	7	20
Demand	25	10	15	5	55

Answer the following questions, giving brief reasons:

(a) Is this solution feasible?

(b) Is this solution degenerate?

(c) Is this solution optimal?

Does this problem have more than one optimal solution? If so, show all of them.

(c) Welldone company has taken the third floor of multi storeyed building for a rent with a view to locate one of their zonal offices. There are five main rooms in this to be assigned to five mangers. Each room has its own advantage and disadvantages. **07**

Some have windows; some are closer to the wash rooms or to the canteen or secretarial pool. The rooms are of all different size and shapes. Each of the five managers was asked to rank their room preferences amongst the rooms 301, 302, 303, 304 and 305. Their preferences were recorded in a table as indicated below:

MANAGER

M1	M2	M3	M4	M5
302	302	303	302	301
303	304	301	305	302
304	305	304	304	304
	301	305	303	
		302		

OR

Q.3 **(a)** Discuss the similarities in the solution procedures for transportation and assignment models. **03**

(b) You are given the information about the cost of performing different jobs by different persons. The job-person marking **X** indicates that the individual involved cannot perform the particular job. Using this information, state (i) the optimal assignment of jobs and (ii) the cost of such assignment. **04**

	JOBS				
PERSONS	J1	J2	J3	J4	J5
P1	27	18	**X**	20	21
P2	31	24	21	12	17
P3	20	17	20	**X**	16
P4	22	28	20	16	27

(c) Determine an initial basic feasible solution for the following transportation problem by VAM **07**

	D1	**D2**	**D3**	**D4**	**SUPPLY**
O1	11	13	17	14	250
O2	16	18	14	10	300
O3	21	24	13	10	400
DEMAND	200	225	275	250	950

Q.4 **(a)** List out process chart events and show it as symbol. **03**

(b) Describe methods of work measurement and explain any one method in detail. **04**

(c) A small maintenance project consist of the following jobs, whose precedence relationships are given below **07**

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration(days)	15	15	3	5	8	12	1	14	3	14

1) Construct network for representing project
2) Find the total float for each activity
3) Find critical path and total project duration

OR

Q.4 **(a)** Explain Work sampling. Compare work sampling with time study. **03**

(b) An automobile company manufacturing scooters has decided to come up with scooter specially designed for the women only. The project involves several activities in the following table. **04**

Activity	Description	Predecessor activity
A	Study design of scooters in the market	-
B	Design the new scooter	A
C	Design the market program	A
D	Design new production system	B
E	Select advertising media	C
F	Test prototype	D, E
G	Release scooter in the market	F

Draw the suitable network.

(c) Write short note on SIMO chart. Draw two handed process chart for **07**

assembly of nut and bolt and give summary for same.

Q.5	**(a)**	What are the types of maintenance?	**03**
	(b)	Explain need for air conditioning and humidification in textile industry.	**04**
	(c)	Explain package type of boiler in detail.	**07**

OR

Q.5	**(a)**	Explain importance of preventive maintenance	**03**
	(b)	Give detail classification of Boilers.	**04**
	(c)	Explain humidification by air washer method with neat sketch.	**07**