Loyola Institute of Business Administration
Chennai-34
EDLSCM
Quantitative Techniques for SCM
ASSIGNMENT-Answer all questions.

1. The company ABC is producing agriculture tools. Demand is highly seasonal for these tools. ABC decided to use aggregate planning to overcome obstacle of seasonal demand and maximize profit. The options of building inventory during slow months, subcontracting some of the work, adding workers during the peak season are some of the options available to ABC.

Demand Forecast data:

Month	Demand(Units)
Jan	1600
Feb	3000
March	3200
April	3800
May	2200
June	2200

The company sells each tool to the retailers for Rs. 500. The opening inventory of ABC in January is 500 units. The initial work force is 100 employees. Working days 21 per month and each employee earns Rs.50 per hour regular time. Each employee works 8 hours per day on regular time and the rest on overtime. Capacity is determined by the total labour hours worked. Machine capacity does not limit the capacity of the production operation. But labour rules do not permit to work more than 8 hours of overtime per month. Various associated costs are given below.

Item	Cost (Rs)
Material cost	300/unit
Inventory holding cost	20/unit/month
Hiring and training costs	4000/worker
Layoff costs	5000/worker
Labour hours required	5 per unit
Regular time cost	40/hour
Overtime cost	70/hour

Consider no limits on inventories and no stock-outs are allowed. Inventory costs are incurred on the ending inventory in the month. The supply chain manager's goal is to obtain optimal aggregate plan over the six month planning horizon, at and at least 500 units in

inventory. Optimal aggregate plan is the one that results in highest profit over the six-month planning horizon.

2. God Raj Ltd., a manufacturer of Refrigerators, likely to invest in Kenya in terms of both manufacturing and Marketing. It has selected four potential cities for locating its manufacturing unit. The proposed capacity and its related fixed cost are given in the table. The cost of transportation per unit of refrigerator (all in $) is also given in the table.

	Nairobi	Mombasa	Wajir	Nakuru	Demand per year
Fixed Cost of Plant	$5 million	$4 million	$2.5 million	$3 million	
capacity	200,000	200,000	400,000	350,000	
East	10	2	10	11	70,000
South	3	3	10	3	100,000
Midwest	7	11	13	4	65,000
North	15	16	3	15	40,000

The management want to select the site or sites for the manufacturing plants. Propose a mathematical model to select the sites/site which minimize the total cost.

3. Develop forecast using Exponential smoothing with Season for the following data and estimate the error.(Smoothing constant Alpha=0.2)

Year	Quarter	Period	Actual demand
2015	1	1	940
2015	2	2	922
2015	3	3	915
2015	4	4	1074
2016	1	5	974
2016	2	6	969
2016	3	7	1016
2016	4	8	1112
2017	1	9	950
2017	2	10	950
2017	3	11	1029
2017	4	12	1185