Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-VIII Examination May 2012

Subject code: 182501

Subject Name: Production and Operations Management

Date: 10/05/2012 **Time: 10.30 am – 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)** Janata Enterprise (JE), a producer of video telephones for the home market need to develop an aggregate production plan for the six from January through June. You have been commissioned to create the plan. The following information is given. **14**

	Jan.	Feb.	March	April	May	June	Total
Demand	500	600	650	800	900	800	4250
No. of Working days	22	19	21	21	22	20	125

The material cost Rs. 100 per unit, inventory holding cost Rs. 10 per month per unit, marginal cost of stock out is Rs. 20 per month per unit, hiring and training cost Rs. 50 per worker, layoff cost Rs. 100 per worker, labor hours required per unit is 4, regular time cost Rs. 1.5 per hour and overtime cost Rs. 18.75 per hour. The beginning inventory is 200 units. Calculate the cost of each of the following strategy.

I. Produce exactly to meet demand; vary workforce (assume opening workforce equal to first months requirements.

II. Constant workforce; vary inventory and allow shortage only (assume starting workforce of 10).

Q.2 **(a)** A consulting company I under contract to carry out six projects, all with deadlines assured in days. From now. The consultants get Rs. 28,000 for project completing on time and incur a penalty of Rs. Rs. 45,000 for each project completed late. How the company schedule the project so that the penalty can be minimized. Below given the project with their time and due date. **07**

Project	1	2	3	4	5	6
Duration in days	3	5	7	9	10	9
Due date	7	11	28	20	11	16

(b) What is tolerance stack? Explain process tolerance stake in detail. **07**

OR

(b) List and explain the possible causes of workpiece deflection while in the location system of a holding devices. **07**

Q.3 **(a)** Best Vision is revamping its assembly lines to improve efficiency. There are 10 steps to assembling a television set. (a) if Best needs to produce 120 televisions in a 40 hour work week, how should the line be balanced? Given that one worker is assigned to each workstation, how many workers are required to operate the line? **10**

Task	Precedence	Time (min)
A	-	8
B	A	4
C	A	7
D	A	3
E	B	7
F	C, E	11
G	D	2
H	G	8
I	F, H	5
J	I	7

What is the efficiency of the line? If demand for television is reduced to 100 sets per 40-hour week, how many workers will be needed to man the line? Re-balance the line and re-calculate its efficiency.

(b) Explain Theory of Constraint in brief. **04**

OR

Q.3 **(a)** TechPower Ltd., is Ahmedabad based manufacturing company. It has always purchased certain component part from a supplier located in Rajkot for Rs. 50 per part including transportation cost. The supplier is reliable and has maintained the same price structure for years. Recently, improvements in operations and reduced product demand have cleared up some capacity in TechPower's own plant for producing component parts. The particular part in question could be produced at Rs. 40 per part, with an annual fixed investment of Rs. 25,000. Currently TechPower needs 300 of these parts per year. **10**

a) Should TechPower make or buy the component part?
b) As another alternative, a new supplier located nearby is offering volume discounts for new customers of Rs. 50 per part for the first 100 parts ordered and Rs. 45 per part for each additional unit ordered. Should TechPower make the component in-house, buy it from the new supplier or stick with the old supplier?

Would your decision change if TechPower's annual demand increased to 2000 parts? Increased to 5000 parts?

(b) Explain with diagram Flexible and U-shaped line layout. **04**

Q.4 **(a)** The Green Garden (GG) chain of superstores imports decorative planters from Italy. Weekly demand for planters averages 1,500 with a standard deviation of 800. Each planter costs $10. GG incurs a holding cost of 25% per year to carry inventory. GG has an opportunity to set up a superstore in the Phoenix region. Each order shipped from Italy incurs a fixed transportation and delivery cost of $10,000. Consider 52 weeks in the year. **10**

a) What is the optimal order quantity of planters for GG?
b) If the delivery lead time from Italy is 4 weeks and GG wants to provide its customers a cycle service level of 90%, how much safety stock should it carry? (take z for 90% prob. = 1.28)

Fastship is a new shipping company that promises to reduce the delivery lead time for planters from 4 to 1 week using a faster ship and expedited customs clearance. Using fast ship will add $0.2 to the transportation cost of each planter compared to the current approach. Should GG go with Fastship? Why? Quantify the impact of the change.

(b) Briefly explain XYZ and SDE classification of inventory items. **04**

OR

Q.4 **(a)** OMKAR Hospital uses 100 syringes of a particular style each day, 365 days per year. The distributor of this product offers the following price schedule. **10**

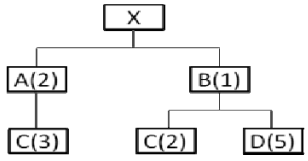
Quantity	Price per Unit
0-999	Rs. 1.00
1000-2499	Rs. 0.80
2500 or more	Rs. 0.70

The cost to hold an item in inventory for a year is estimated to be 30% of its cost, and the order cost for item is estimated to be Rs. 15 per order. Determine the most economical quantity to buy each time this syringe is purchased. Assume the minimum inventory is zero.

(b) Explain Delphi method of forecasting. **04**

Q.5 **(a)** Given the *product structure tree* for "X". The lead time and on hand inventory of each item is also given. 95 units of X are to be supplied in 10^{th} week. Take order quantity for each item as its net requirement. Provide a materials requirements plan that defines the number of units of each component and when they will be needed **10**

Item	X	A	B	C	D
On Hand Inventory	50	75	25	10	20
Lead Time	2	3	1	2	2



(b) Explain functions of process planning. **04**

OR

Q.5 **(a)** HiTek computer services repair and service computers at its store. The company has accumulated the demand data shown in the given table for repair and service calls for the last 12 months. Forecast the demand for the next 12 months (from February to January) using exponential smoothing method with $\alpha = 0.5$. Also forecast the demand for the same period using trend adjusted exponential smoothing with $\alpha = 0.5$ and $\beta = 0.3$ **10**

Month	January	February	March	April	May	June
Demand	37	40	41	37	45	50

Month	July	August	September	October	November	December
Demand	43	47	56	52	55	54

(b) Explain problems of selective assembly. **04**

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