NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF TEXTILE TECHNOLOGY

END OF SEMESTER EXAMINATIONS JANUARY 2008
PRODUCTION ANALYSIS TXT 4234

TIME: 3HOURS

INSTRUCTIONS

1.   Answer Question 1 and any other 4 questions
2.   The first fifteen minutes should be spent reading the question paper and making notes
3.   **Do not** open your answer sheet until told to do so

4.   Marks will be awarded for skill in appreciating the scope of questions, clarity of argument and conciseness of presentations as well as for the knowledge displayed by you.

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1.   You have just been appointed production manager of a textile manufacturing company in Zimbabwe. The company has over 1000 employees and has spinning, weaving and dyeing departments. In addition, there is another department, which manufactures sheets, shirts, T-shirts and knitwear. Below are some of the characteristics of the company. The company has no preventive maintenance system and breakdown maintenance is used. Stocking costs for spares are very high and maintenance personnel are complaining about overwork. Morale is very low and reject levels are very high as shown in Table Q1 and there are high customer returns. Process disruptions are frequent due to poor quality materials. There is no vendor rating system in place and no formal quality system. Products currently being manufactured were designed in 1987 by designers who have since left. Customers are unhappy with the delivery times and there are high inventories of raw materials and work in progress.

Your task is to manage the production department and advise the Managing Director on ways to improve productivity and increase return on assets to 25% within two years.

	425
Number of products manufactured	
Number of managers	30
Reject levels in production	7%
Company relative market share 5 years ago	30%
Company relative market share this year	14%
Return on assets	8%
New product development	Nil

Required

(a) Identify the production management challenges the textile firm is facing.
(5marks)

(b) Explain and give the steps you would take to use variety control to reduce some of the problems identified in (a). (5 marks)

(c) How will you use value analysis to improve the company's business performance. (5 marks)

(d) Explain how a formal quality management system would assist in improving the return on assets for the firm. (5 marks)

2. (a) (i) Discuss the classification of forecasting encountered in manufacturing.
(4 marks)

(ii) Outline three types of capacity and give the significance of each.
(3 marks) .

(b) The inventory manager wants to develop a short range forecasting system. He decides to select the best method, using results of the 10 most recent weeks and the actual demand is shown below in **Table Q2**

Week	1	2	3	4	5	6	7	8	9	10
Demand	100	125	90	110	105	130	85	102	110	90

Table Q2

(i) Use the 3-week and 5-week moving averages to estimate the demand for weeks 6 to week 10. Calculate the mean absolute deviation in each case and select the better method. (3 marks)

(ii) Using a forecast of 100 for week 5 and an exponential smoothing constant of 0.2, calculate the forecast demand for week 6. (3 marks)

(iii) Explain the importance of assigning weights to various periods when using time series forecasts. (1 mark)

c) Outline the elements of Lean Manufacturing and how they apply to the textile industry in Zimbabwe. (6 marks)

3.   (a)   Outline the production planning process.   (5 marks)
         (b)   Discuss the techniques used in textile manufacturing to
             (i)   alter demand to suit capacity.
             (ii)   alter capacity to suit demand.   (6 marks)

      (c) Discuss the techniques you can use to reduce the scheduling problem in manufacturing.
                                                                                  (4 marks)

      (d) Discuss the components of total productive maintenance and explain its importance in
          meeting delivery dependability in manufacturing.   (5 marks)

4.   (a)   Explain the terms 'quality of conformance' and 'dimensions of product quality'
                                                                  (5 marks)
         (b)   Discuss the quality responsibilities of the following :-
             (i)   stores and purchasing.
             (ii)   manufacturing departments.
             (iii)   chief executive.   (6 marks)

       (c)   Outline the main differences between the ISO 9000 system and the Total   Quality
             Management systems used in textile industry.   (9 marks)

5.   Cradle Ltd is a company manufacturing furniture upholstery. *Table 2* shows its demand
      schedule for 2005.

      Table 2: Demand schedule for Cradle

Month	J	f	m	a	M	j	j	a	s	o	n	D
Demand in 1000 units	2,7	3,5	4,7	1,8	1,5	3,245	4,25	3,875	2,975	1,875	2,5	1,1

      In December, production was 1800 units and there was just enough labour to produce the demand
      without overtime or subcontracting. Ending inventory in December is 250 units. Operating data is
      as follows:

      Stockout costs $35
      Holding cost per unit per week $2,50
      Hiring cost per employee $350
      Termination cost per employee $275

Labour cost per hour $8
Overtime cost per hour $12
Subcontracting cost per unit $35
Labour hours per unit 3,20
Working hours per week 40
Maximum hours overtime per week 10
Weeks per month 4

Develop two aggregate plans based on:-

(i) Chase demand based on hiring and termination of employees where overtime and subcontracting are not an option.
(ii) Level strategy based on production of the average monthly demand in the period and use of overtime and subcontracting.

 Deduce the better method by considering total costs.   (20 marks)

6.   (a) Discuss and outline the objectives of
            (i) The master production schedule(MPS)   (2 marks)
            (ii) Material requirement planning (MRP)   (2 marks)
            (iii) Manufacturing resources management (MRM) or manufacturing resource planning
                (MRPII).   (3 marks)

(b) Carver and Co run a manufacturing company which operate a small print shop in Bulawayo where there is one offset press to perform work for customers. Today is day 55 and jobs waiting to be processed are shown below in *Table Q5*

Job	A	B	C	D	E	F
Processing time	9	11	8	12	7	5
Date received	37	39	42	47	48	55
Due date	71	81	75	98	86	108
Changeover time (minutes)	30	48	10	60	90	15

Schedule the jobs using
    (i) First come First served
    (ii) Least change over cost
In each case calculate Total flow time, average tardiness   (6 marks)

c) Give an overview of the integrated closed loop production planning and inventory
    control system. Explain why it is important to carry out a rough-cut capacity planning
    (RCCP).   (7 marks)

<div align="center">END OF QUESTION PAPER</div>