The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Diploma in Technology/Bachelor of Technology Hons in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**DMX4335/ MEX4135 Production Management**
Academic Year	:	2019/ 2020
Date	:	20th January 2020
Time	:	0930 hrs. – 1230 hrs.
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 07 questions. All questions carry equal marks.
3. Answer any 05 questions only.

Q1

i. Discuss the importance of demand forecasting in the fields of sales and production.

ii. The recorded monthly demand data for an item is given in the table 1-1.

Table 1 - 1

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Demand	75	78	81	70	76	81	72	78	82	74	78	80

(a). Calculate three month moving average forecast for months from April to December

(b). Calculate the single exponentially smoothed forecast using a smoothing factor α of 0.2 for months from April to December.

iii. Compare the results obtained in (a) and (b) and comment on the observation

Q2.

i. Briefly explain the purpose and use of the "transportation algorithm" in capacity management

ii. Factory X, Y and Z produce identical oil containers 40, 60 and 50 respectively in a unit time. These containers are transported to four different warehouses A, B, C and D with the capacity of 20, 30, 50 and 50 respectively. The transportation cost from each factory to warehouse is given in the table 2-1 , in Rupees

Table 2 -1

Warehouse / Factory	A	B	C	D
X	4	6	8	8
Y	6	8	6	7
Z	5	7	6	8

(a.) Determine the basic feasible transportation cost using any method. You must mention the method you used.

(b.) Find the minimum transportation cost

Q3. i. What is meant by "Quality Costs"? List out three (3) types of quality costs associated in a manufacturing organization?

ii. A machine produces components at the rate of 90 per hour. Every hour a random sample of five component is taken and their lengths are measured. After 10 hours, the data given in the table 3-1 have been collected. Use these data to design the control chart for the sample mean and comment whether the process is under control or not considering the control chart of mean.

Table 3-1 Length Measurements

Sample No	Measurement (cm)				
1	6.00	6.10	6.00	6.05	5.95
2	6.10	6.10	6.00	6.05	6.05
3	6.00	6.05	6.00	6.05	6.00
4	6.00	6.00	5.95	6.00	6.05
5	6.00	6.05	6.05	6.05	6.00
6	6.00	6.10	6.10	6.05	6.00
7	6.00	6.10	6.05	6.15	6.05
8	6.00	6.10	6.10	6.00	6.05
9	6.00	6.00	5.95	6.00	6.00
10	6.00	6.05	6.00	6.10	5.95

Control limits may be considered as follows for the sample of **n = 5**;

Action Limits = $\overline{X} \pm$ **0.59** $\overline{W}$ Warning Limits = $\overline{X} \pm$ **0.38** $\overline{W}$

Q4 i. State three benefits of implementing a good inventory management system in a manufacturing organization.

ii. Total average yearly inventory cost is given by the equation below. Name all the costs involved.

$$K = A.\frac{\lambda}{Q} + \frac{I(Q+s)+s}{2} + c\lambda$$

iii. The demand for a certain product is 25000 units per year. The fixed administrative cost of placing an order is Rs. 1500. If each item cost Rs. 755 and the stock holding cost is Rs. 150 per unit per year, calculate

a. Economic lot size

b. How often orders should be placed

c. Total average yearly inventory cost.

Q5. i. Briefly explain objectives of a good facilities layout.

ii. Explain three layout plans; that can be used in a manufacturing organization.

ii. Group Technology is considered as an effective concept. What are the methods available for grouping components of similar families? List at least three (3) of them.

Q6 i. Explain "preventive maintenance" and "breakdown maintenance" specifying advantages and disadvantages.

ii. Discuss the purpose of introducing "work study" in a manufacturing organization.

iii. What are the ergonomic factors that may lead to better performance of workers. Explain three ergonomic factors applicable in a textile manufacturing organization.

Q7. i Briefly explain following terms

a. Gantt Chart
b. Critical path method
c. Job Slack

ii A project consists of six activities. Duration and precedence of each activity is given in the table 7-1 below.

Table 7-1

Activity	Preceding Activity	Duration
A	-	3
B	A	4
C	A	9
D	B	6
E	C	3
F	D,E	3

a. Draw the network diagram
b. Calculate early start, late start, early finishing, latest finishing days of all the activities
c. Find the critical path and total project duration.