The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Bachelor of Technology Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX4135 Production Management**
Academic Year	:	2016/ 2017
Date	:	December 04, 2017
Time	:	0930 hrs. – 1230 hrs.
Duration	:	3 hours

Answer Five Questions (Each question carries 20 Marks)

Q1

(a) Discuss the importance of demand forecasting in the fields of sales and production.
(6 marks)

(b) The recorded monthly demand data for an item is given in the Table 01 below.

Table 01

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Demand	750	780	810	920	1080	1160	1100	1080	920	870	780	720

(i) Calculate three month moving average forecast for months from April to December.
(5 Marks)

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

(iii) Compare the results obtained in (i) and (ii) and justify the most appropriate method for forecasting the demand. (4 Marks)

Q2.

(a) Briefly explain the purpose and use of the "transportation algorithm."

(3 Marks)

(b) State three of the methods available for obtaining a feasible basic solution.

(3 Marks)

(c) Factory X, Y and Z produce identical oil containers 40, 60 and 60 respectively in a unit time. These containers are transported to four different warehouses A, B, C and D with the capacity of 20, 30, 60 and 50 respectively. The transportation cost from each factory to warehouse is given in the table 02 , in Rupees

Table 02

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

(i) Determine the Basic feasible transportation cost (8 Marks)

(ii) Obtain minimum transportation cost. (6 Marks)

Q3.

(a) What is meant by "Quality Costs"? List out three (3) types of quality costs which are associated in a manufacturing organization? (6 Marks)

(b) A machine produces components at the rate of 90 per hour. Every hour a random sample of five components is taken and their lengths are measured. After 10 hours, the data given in the table 03 were collected.

Table 03 – Length Measurements

Sample No	Measurement (cm)				
1	8.00	8.10	8.00	8.05	7.95
2	8.10	8.10	8.00	8.05	8.05
3	8.00	8.05	8.00	8.05	8.00
4	8.00	8.00	7.95	8.00	8.05
5	8.00	8.05	8.05	8.05	8.15
6	7.85	7.90	8.10	8.05	8.00
7	8.00	8.10	8.05	8.15	8.25
8	8.00	8.10	8.10	8.00	8.05
9	8.00	8.10	7.95	7.90	8.00
10	8.00	8.05	8.00	8.10	7.95

(i) Use these data to design the control chart for the sample mean. (10 Marks)

(ii) Comment whether the process is under control or not considering the control chart of mean.

(4 Marks)

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

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

Q4

(a) What are the reasons for implementing a good inventory management system in a manufacturing organization?

(4 Marks)

(b) Total average yearly inventory cost is given by the equation,

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

Where, A – Fixed administrative cost of placing an order

I – Stock holding cost / unit/ unit time

C – Cost of one unit of item

s - Minimum stock level maintaining

Q- Order quantity (lot size)

Derive the equation for Economic lot size **Q*** . (4 Marks)

(c) The demand for a certain product is 7400 units per year. The fixed administrative cost of placing an order is Rs. 1500. If each item cost Rs. 85 and the stock holding cost is Rs. 50 per unit per year, calculate

(i). Economic lot size (6 Marks)

(ii). How often orders should be placed (2 Marks)

(iii). Total average yearly inventory cost. (4 Marks)

Q5.

(a.) Compare three layout plans; Process layout, Product layout and Group layout in relation to a manufacturing system and point out the advantages of each.

(5 Marks)

(b) Explain the concept "Group Technology" in a production process.

(5 Marks)

(c) Briefly explain five (5) benefits that could be derived from applying Group Technology concepts in a manufacturing organization. (5 Marks)

(d) What are the methods available for grouping components of similar families? List at least three (3) of them. (5 Marks)

Q6.

(a) Evaluate the usefulness of critical path analysis method to the management of projects considering positive and negative aspects of the method.

(6 Marks)

(b) Draw the activity diagram for the activities in a project given in the table 04.

(4 Marks)

Table 04

Activity	Time Duration (days)	Preceding Activity
A	8	None
B	12	A
C	25	B
D	15	B
E	30	B
F	10	C,D
G	10	E,F
H	5	G
I	5	H

(i) Determine the Critical path of the project. (4 Marks)

(ii) Calculate the planned duration of the work in days. (2 Marks)

(iii) Identify any non-critical tasks and the float (free slack) on each activity. (4 Marks)

Q7.

(a) Explain the advantages of work study in a manufacturing organization in terms of worker benefits and organizational benefits. (5 Marks)

(b) State the two main activities in a work study and explain the order of these activities carried out giving reasons. (5 Marks)

(c) When calculating the standard time for the job in work measurement, several allowances are considered. Name four of them. (5 Marks)

(d) Discuss the need of allowances considered for calculating the standard time of the job, giving examples. (5 Marks)

Q8 Write short notes on any **four (04)** of the following.(Each carry five marks)

(a) Advantages and disadvantages of "preventive maintenance" and "breakdown maintenance".

(b) Environmental factors that should be controlled in a factory environment and its contribution to improve the productivity.

(c) Breakeven analysis and its uses.

(d) Fixed and variable costs.

(e) Price elasticity of demand.

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