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The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Mechanical Engineering

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: DMX4335/ MEX4135 Production Management**
Academic Year	: 2017/18
Date	: 11th February 2019
Time	: 0930-1230hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (8)** questions in 05 pages.
3. Answer any **Five (5)** questions only. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. Relevant charts/ codes are provided.
6. Closed Book Test (CBT).
7. Answers should be in clear hand writing.
8. Do not use Red colour pen.

Q1 (i). List down at least three facts to explain the importance of a good inventory management system in a manufacturing organization? *5 Marks*

(ii). List down the costs occurred when managing an inventory. *5 Marks*

(iii). The demand for a certain product is 1800 units per year. The fixed administrative cost of placing an order is Rs.1500. If stock holding cost is Rs.12 per unit per year, calculate the following.

a. Economic lot size *7 Marks*

b. How often orders be placed *3 Marks*

Q2. (i). There are three types of forecasting methods used in time series projection method of demand forecasting. Explain them in brief.

5 Marks

(ii).

Table 1-1

Months	1	2	3	4	5	6	7	8	9	10	11	12
Gasoline sales in a month (1000s of gallons)	17	21	19	23	18	16	20	18	22	20	15	22

a. Develop a three month moving average forecasts for this time series given in table 1-1 *5 Marks*

b. Use $\alpha = 0.2$ to compute the exponential smoothing forecast for the time series given. *5 Marks*

c. Compare the demand for the month 08, using three month moving average method and the exponential smoothing method. *5 Marks*

Q3. (i). Briefly explain the purpose of transportation algorithm. *5 Marks*

(ii). A company has factories at locations A, B and C which supply warehouses at locations P,Q and R. Weekly factory capacities (supply) are 250, 180 and 160 units respectively.Weekly warehouse requirements (demand) are 180, 190 and 220 units respectively. Shipping costs per unit are given in Rs as follows in the table 3-1

Table 3-1

Warehouse / Factory	P	Q	R
A	8	10	12
B	14	8	10
C	16	12	12

(iii). Determine the feasible **basic solution** using any method familiar to you.

10 Marks

(iv). Check the optimality of the above answer and verify whether it is optimal solution or not. *5 Marks*

Q4. Activity scheduling plays a vital role in any project.

(i). Explain the following terms

a. Total float of an activity b. Critical path *4 Marks*

(ii).

Table 4-1

No	Activity	Duration (Weeks)	Predecessor Activity
1	A	1	-
2	B	3	A
3	C	5	B
4	D	3	B
5	E	6	B
6	F	2	C,D
7	G	2	E,F
8	H	1	G
9	K	1	H

a. Construct the network diagram using data in table 4-1 *8 Marks*

b. Identify the critical path. *4 Marks*

c. What is the project duration? *2 Marks*

d. What are the activities which can be delayed without affecting project duration? *2 Marks*

Q5. (i). Name three types of facilities layouts used in manufacturing organizations. *6 Marks*

(ii). Explain each layout concentrating their main characteristics. Give examples of the applications of these layouts. 8 Marks

(iii). Explain the concept of Group Technology in relation to a manufacturing system layout planning. *6 Marks*

Q6. (i). What do you mean by "work study " in a specific operation? *3Marks*

(ii). How do the workers of an organization benefit from work study? Explain. *7 Marks*

(ii). What are the ergonomics factors needed to be considered in a garment factory? *3 Marks*

(iii). Explain how the ergonomics improvements of a working environment affect the profitability of the organization. *7 Marks*

Q7. (i.) Explain four types of costs associated with quality function *4 Marks*

(ii). A machine produces nails. Every hour a random sample of five components is taken and their lengths are measured. After ten hours, the data is given in table 7-1

Table 7-1

Sample	Length (mm)				
1	9.00	9.10	9.00	9.06	8.95
2	9.10	9.10	9.00	9.05	9.05
3	9.00	9.05	9.00	9.05	9.00
4	9.00	9.00	8.95	9.00	9.05
5	9.00	9.05	9.05	9.05	9.00
6	9.00	9.10	9.10	9.05	9.00
7	9.00	9.10	9.05	9.15	9.05
8	9.00	9.10	9.10	9.00	9.05
9	9.00	9.00	8.95	9.00	9.00
10	9.00	9.05	9.00	9.10	8.95

a. Calculate sample mean (x) and sample range (w) for each sample. *6 Marks*

b. Calculate the overall mean $\bar{\bar{X}}$ and average range $\bar{w}$ for the process *4 Marks*

c. Draw control chart for mean, if control limits are given as : $\bar{\bar{X}} \pm m\ \bar{w}$; where factors for control chart for mean is given in table 7-2. *6 Marks*

Table 7-2

Sample Size	Factor (m) for warning limits	Factor (m) for action limits
2	1.23	1.94
3	0.67	1.05
4	0.48	0.75
5	0.38	0.59
6	0.32	0.50
7	0.27	0.43

Q8. Distinguish and explain following pair of terms

(i). Breakdown Maintenance and Preventive Maintenance *5 Marks*

(ii). Quality Control and Quality Assurance *5 Marks*

(iii). Production and Productivity *5 Marks*

(iv). Direct cost of production and indirect costs of production *5 Marks*