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

063

Study Programme	:	BTech Hons in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**DMX 6301 Industrial Engineering**
Academic Year	:	2020-2021
Date	:	10 February 2023
Time	:	0930-1230 hrs
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **seven (07)** questions. All questions carry equal marks.
3. **Answer any five (05) questions only**.
4. Use the table attached at the end of the question paper to **answer Q3.**

Q1.

(a) What are the areas that should be analyzed before formulating the corporate strategy of an organization? (4 Marks)

(b) Differentiate between the terms "manufacturing strategy" and "corporate strategy" as applicable to a production organization of your choice. (6 Marks)

(c) What is PESTEL analysis? (4 Marks)

(d) Explain PESTEL analysis emphasizing the importance of analyzing each factor in strategic decision making in the current crisis of Sri Lanka.

(6 Marks)

Q2. (a) Work study is beneficial for workers as well as management. Justify the statement, giving at least 3 reasons.?

(6 Marks)

(b) What are the factors that must be considered when selecting a job for method study? Explain in brief main three (03) factors.

(6 Marks)

(c) Give two examples each for "productive activities" and "nonproductive activities" you may identify during a work study. (4 Marks)

(d) What is the basic procedure of method study? List down main steps.

(4 Marks)

Q3. (a) What are the benefits of MRP? (3 Marks)

(b) Why MRP system is not the complete solution for improving organizational efficiency? (3 Marks)

(c) Product X is made of three (3) units of Y and Two (2) units of Z. Y is made of four (4) units of A and two (2) units of B. Z is made of two (2) units of A and three (3) units of C.

Lead times are as given below:

Product	X	Y	Z	A	B	C
Lead Time (Weeks)	1	2	2	2	1	1

(i) Draw the Product structure tree (BOM). (4 Marks)

(ii) If 100 units of X are needed in week ten (10), develop a Material Requirement Plan.

a) when there are currently no on hand in stock (5 Marks)

b) when there are currently on hand in stock of 50X, 40Y, 30Z, 50A,100B and 400C.

(5 Marks)

(Use the MRP sheets attached at the end of the question paper to answer Q3)

Q4. (a). Distinguish observed time and the basic time. (4 Marks)

(b). What are the allowances you may consider when calculating standard time for an activity in lathe operation? (6 Marks)

(c) The figures below are the observed times obtained by stopwatch method during 25 Observations of a single element of a manual task.

Observation Number (N)	Observed time for element (in 1/100 min)
1	54
2	50
3	53
4	52
5	50
6	45
7	50
8	58
9	50
10	52

(d) Find the observed time for this element of work. (3 Marks)

(e) What is the basic time if a rating factor for a skilled level is + 0.11? (3 marks)

(f) Calculate the standard time of the job if the personal allowance is considered as 5%. (4 Marks)

Q5. (a) Introduction of an ERP systems in a business organization needs many factors to be considered. Name three of them. (4 Marks)

(d) What are the benefits of an ERP system implemented in a manufacturing organization? (4 Marks)

(c) State at least three possible causes of failure of ERP systems. Give reasons clearly. (6 Marks)

(d). Distinguish ERP from MRP (6 Marks)

Q6. (a) What is the purpose of using linear programming techniques in decision making? (3 Marks)

(b) What are the limitations of graphical method? (3 Marks)

(c) An automobile part manufacturer makes two types of parts, type A and Type B. The available resources, amount of material needed to produce one-unit, maximum possible amount of resources and the profit from one unit of products are given in the Table below.

Resources	Amount needed for a unit		Maximum amount of resources available
	Type A	Type B	
Material (kg)	70	25	25000
Labour (hrs)	3	4	300
Profit per unit (Rs)	6500	8500	

(i) Determine and define the decision variables. (2 Marks)

(ii) Formulate the objective function. (2 Marks)

(iii) Formulate each constrains. (4 marks)

(iv) Find the number of Type A and Type B items manufactured to maximize the profit. (6 marks)

Q7. Write short notes on **any four (04)** of the following: (5 Marks each)

(a) The main role of an Industrial Engineer and the critical decision making areas he may have to deal with.

(b) Product life cycle and its importance.

(c) Priority rules of dispatching systems.

(d) "Future will be more sophisticated, and knowledge based" Explain at least four of the skills that should be developed by an industrial engineer to meet the challenges of future.

(e) Compare and contrast MAKE TO STOCK and MAKE TO ORDER methods used in production planning.

		Week									
Item		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
X (LT=1)	Gross Requirement On Hand ( ) Net Requirement Planned Order receipts Planned Order release										
Y (LT=2)	Gross Requirement On Hand ( ) Net Requirement Planned Order receipts Planned Order release										
Z (LT=2)	Gross Requirement On Hand ( ) Net Requirement Planned Order receipts Planned Order release										
A (LT=2)	Gross Requirement On Hand ( ) Net Requirement Planned Order receipts Planned Order release										
B (LT=1)	Gross Requirement On Hand ( ) Net Requirement Planned Order receipts Planned Order release										
C (LT=1)	Gross Requirement On Hand ( ) Net Requirement Planned Order receipts Planned Order release										

		Week									
Item		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
X	Gross Requirement										
(LT=1)	On Hand ( )										
	Net Requirement										
	Planned Order receipts										
	Planned Order release										
Y	Gross Requirement										
(LT=2)	On Hand ( )										
	Net Requirement										
	Planned Order receipts										
	Planned Order release										
Z	Gross Requirement										
(LT=2)	On Hand ( )										
	Net Requirement										
	Planned Order receipts										
	Planned Order release										
A	Gross Requirement										
(LT=2)	On Hand ( )										
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	Planned Order receipts										
	Planned Order release										
B	Gross Requirement										
(LT=1)	On Hand ( )										
	Net Requirement										
	Planned Order receipts										
	Planned Order release										
C	Gross Requirement										
(LT=1)	On Hand ( )										
	Net Requirement										
	Planned Order receipts										
	Planned Order release										