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| 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 | : 06 February 2022 |
| Time | : 0930-1230.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.
4. Use the table attached at the end of the question paper to answer Q3.

Q1.

- (a) The corporate strategy formulation process requires three areas of analysis; Name these areas. (6 Marks)
- (b) Briefly explain PESTEL analysis emphasizing the importance of the analysis in strategic decision making. (6 Marks)
- (c) What is meant by “manufacturing policy”? (3 Marks)
- (d) Differentiate between the terms “manufacturing strategy” and “corporate strategy” as applicable to a production organization of your choice.

(5 Marks)

- Q2. (a) What is the purpose of work study? (3 Marks)
- (b) How does the management of an organization benefit from work study? (3 Marks)
- (c) What are the factors that must be considered when selecting a job for method study? Explain main three factors. (6 Marks)
- (d) What are the recording techniques used in method study? Name two of them. (2 Marks)
- (e) What is the basic procedure of method study? List down main steps. (6 Marks)
- Q3. (a) What are the benefits of MRP? (3 Marks)
- (b) What are the elements of the MRP? (3 Marks)
- (c) Product X is made of two units of Y and three units of Z. Y is made of three units of A and two units of B. Z is made of two units of A and two units of C.

Lead time 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 20X, 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). Consider that you were asked to do a work-study for the place you had the Industrial Training

i. Write two productive activities (4 Marks)

ii. Write Two nonproductive activities carried out by workers in that organization

(4 Marks)

(b) 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 | 44 |
| 2 | 40 |
| 3 | 43 |
| 4 | 42 |
| 5 | 40 |
| 6 | 25 |
| 7 | 40 |
| 8 | 48 |
| 9 | 50 |
| 10 | 42 |

(c) Check whether sufficient number of observations (N) of this element been made to provide an accuracy of 5% with a confidence interval of 95%?.

(3 Marks)

where
$$N = \frac{40 \sqrt{N \sum X^2 - (\sum X)^2}}{\sum X}$$

(d) Calculate the average observed time

(2 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 considered is 5 %

(4 Marks)

- Q5. (a) As an Industrial Engineer, identify 4 decision areas you may have to deal with? (3 Marks)
- (b) "Future will be more sophisticated, and knowledge based" Explain at least four of the skills that should be developed by an industrial engineer to face the challenges of future? (8 Marks)
- (c) What are the four main activities in Production Planning? (3 Marks)
- (d). Name two of the common production control systems. (2 Marks)
- (i) Describe briefly the limitations of using priority rules in dispatching systems. (4 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) A Tile manufacture makes two types of tiles type A and Type B. The available resources, amount of clay needed for a 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 | |
| Clay (g) | 100 | 250 | 25000 |
| Labour (hrs) | 2 | 1 | 300 |
| Profit per unit (Rs) | 80 | 60 | |

- (i) Determine and define the decision variables (2 Marks)
- (ii) Formulate the objective function (2 Marks)
- (iii) Formulate each constraints (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** of the following:

(5 Marks each)

- (a) The main role of the Industrial Engineer
- (b) Product life cycle and its importance.
- (c) Advantages of ERP systems.
- (d) Factors to be considered when a MRP system is implemented in a manufacturing organization
- (e) Possible causes for failure of ERP systems
- (f). ERP life cycle

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| Item | | Week | | | | | | | | | |
|-------------|------------------------|------|---|---|---|---|---|---|---|---|----|
| | | 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 | | | | | | | | | | |

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| | On Hand () | | | | | | | | | | |
| | Net Requirement | | | | | | | | | | |
| | Planned Order receipts | | | | | | | | | | |
| | Planned Order release | | | | | | | | | | |
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