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**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2021/2022**

COURSE NAME : INDUSTRIAL ENGINEERING

COURSE CODE : BPB 31303

PROGRAMME CODE : BPB

EXAMINATION DATE : JULY 2022

DURATION : 3 HOURS

INSTRUCTION

1. ANSWER ALL QUESTIONS

2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.

3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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TERBUKA

- Q1** (a) List **FIVE (5)** reasons to explore Industrial Engineering. (5 marks)
- (b) Explain **FOUR (4)** techniques used in Industrial Engineering to improve the organization's performance. (8 marks)
- (c) Differentiate **FOUR (4)** items of value added and non-value added activities in Lean Manufacturing. (8 marks)

**Q2** Mahmud Enterprises is a machine shop planning to move from small to a new and larger location. The new building will be 60 feet long and 40 feet wide. Mahmud wants to arrange its six workstations roughly equal in size to minimize interdepartmental parts handling costs. The flows and existing facility layout are shown in **Table Q2**. The cost of moving one load between adjacent departments is RM15. Moving a load between nonadjacent departments cost RM30.

**Table Q2: Distance between work areas at Mahmud Enterprises**

Distance Between Work Areas						
Workstation	A	B	C	D	E	F
A	--	7	25	15	20	30
B		--	35	20	10	15
C			--	15	0	15
D				--	15	35
E					--	10
F						--

- (a) Construct Interdepartmental Flow Graph of current layout. (5 marks)
- (b) Calculate the cost of current layout. (3 marks)
- (c) Propose the new and improved layout of the new building. (8 marks)
- (d) Analyse the cost of current and the new improved layout. (4 marks)



- Q3** (a) Outline Six Big Losses in Total Preventive Maintenance. (18 marks)
- (b) Discuss **THREE (3)** characteristics of Breakdown Maintenance. (6 marks)
- (c) Over the past 24 months, the maintenance records for Red Eagle Enterprise are tabulated in **Table Q3(c)**. Because of the risk associated with a failure, the cost of each failure is estimated at RM1200.00 each time the machine broke down. To counter the problem, a new scheduled preventive maintenance approach has been proposed. This new approach will guarantee repairs on any and all failures as a part of a service contract. The cost of the service is RM490.00 per month.

**Table Q3(c): Maintenance Record at Red Eagle Enterprise**

Number of Breakdowns	0	1	2	3	4	5
Frequency of Breakdowns (months)	4	3	1	5	5	0

- (i) Calculate the probability of breakdown. (3 marks)
- (ii) Calculate the expected number of breakdown per month. (4 marks)
- (iii) Determine the costs of breakdowns maintenance per year. (2 marks)
- (iv) Determine the costs of preventive maintenance per year. (2 marks)
- (v) Decide whether Red Eagle Enterprise should use the preventive maintenance approach. (2 marks)

- Q4** (a) Prepare Lean Production System (LPS) house. (8 marks)
- (b) Lean manufacturing is a production process based on an ideology of maximising productivity while simultaneously minimising waste within a manufacturing operation. The lean principle sees waste is anything that does not add value that the customers are willing to pay for.
- Define with an appropriate example:
- (i) Continuous Improvement or Kaizen (2 marks)
  - (ii) Lead Time (2 marks)
  - (iii) Just In Time (2 marks)
  - (iv) Pull System (2 marks)
- (c) Ergonomics is the process of designing or arranging workplaces, products and systems so that they fit the people who use them. Most people have heard of ergonomics and think it is something to do with seating or with the design of car controls and instruments. Ergonomics applies to the design of anything that involves people, workspaces, sports and leisure, health and safety.
- (i) Discuss the perfect ergonomic workspace. (3 marks)
  - (ii) Explain ergonomics multidisciplinary. (3 marks)

- END OF QUESTIONS -