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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020**

COURSE NAME : INDUSTRIAL ENGINEERING
COURSE CODE : BPB 31303
PROGRAMME CODE : BPB / BPP
EXAMINATION DATE : JULY 2020
DURATION : 24 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS.
OPEN BOOK EXAMINATION

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

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TERBUKA

- Q1 (a) Industrial engineering (IE) is the branch of engineering that involves figuring out how to make or do things better. Industrial engineering are concerned with reducing production costs, increasing efficiency, improving the quality of products and services, ensuring production run smoothly, protecting the environment and complying with regulations.

According to the Institute of Industrial Engineers, IE works to eliminate waste of time, money, materials, energy and other commodities. For example, industrial engineers may work to streamline an operating room, shorten a roller-coaster line, make assembly lines safer and more efficient, and speed up the delivery of goods.

- (i) Discuss **THREE (3)** objectives of Industrial Engineering subject towards perspective in today's real life situation

(3 marks)

- (ii) Analyse the importance of Industrial Engineering reflecting to the Covid-19 Pandemic situation

(6 marks)

- (b) Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system. This discipline applies theory, principles, data and methods to design in order to optimise the human well-being and overall system performance. Ergonomics can roughly be defined as the study of people in their working environment. More specifically, an ergonomist designs or modifies the work to fit the worker, not the other way around. The goal is to eliminate discomfort and risk of injury due to work. In other words, the employee is our first priority in analyzing a workstation.

Ergonomics, the process of designing or arranging workplaces, products and systems so that they fit the people who use them. Most people only have heard of ergonomics and think it is something to do with seating or with the design of car controls and instruments, but it is so much more. Ergonomics applies to the design of anything that involves people, workspaces, sports and leisure, health and safety.

Ergonomics or 'human factors' is a branch of science that aims to learn about human abilities and limitations, and then apply this learning to improve people's interaction with products, systems and environments. Ergonomics aims to improve workspaces and environments to minimise risk of injury or harm. So as technologies change, so too does the need to ensure that the tools we access for work, rest and play are designed for our body's requirements.

Discuss with an appropriate example.

- (i) Situations associated with an increased risk of errors

(3 marks)

- (ii) Individual factors predispose to error

(3 marks)

- (iii) The importance of human factor in designing products (3 marks)

Q2 (a) Facility layout and design is an important component of a business's overall operations, both in terms of maximizing the effectiveness of the production process and meeting the needs of employees. The basic objective of layout is to ensure a smooth flow of work, material, and information through a system. The basic meaning of facility is the space in which a business's activities take place. The layout and design of that space impact greatly how the work is done. The flow of work, materials, and information through the system.

The key to good facility layout and design is the integration of the needs of people (personnel and customers), materials (raw, finishes, and in process), and machinery in such a way that they create a single, well-functioning system. The objective of layout strategy is to develop an effective and efficient layout that will meet the firm's competitive requirements.

Chuan Lee is a owner of Chuan Enterprises, a machine shop is planning to move from small to a new and larger location. The new building will be 60 feet long and 40 feet wide. Chuan Lee envisions the building as having six department of production areas, roughly equal in size. Chuan Lee has developed the following matrix to indicate distance between the six work areas as shown **Table Q2(a)**. The cost of moving one load between adjacent departments is RM10 Moving a load between nonadjacent departments cost RM20.

Table Q2(a): Distance between work areas at Chuan Enterprises

Distance Between Work Areas						
Department	Material	Welding	Drills	Lathes	Grinders	Benders
Material	--	5	30	20	15	20
Welding		--	40	15	10	10
Drills			--	35	20	5
Lathes				--	10	0
Grinders					--	5
Benders						--

- (i) Construct Interdepartmental Flow Graph of current layout (3 marks)
- (ii) Propose the new and improved layout of the new building (4 marks)
- (iii) Prepare justifications of proposed layout based on **Q2(a)(ii)** (4 marks)
- (iv) Outline **THREE (3)** factors that should be considered when designing office layout (6 marks)



- (b) Maintenance management is an important component of a well-functioning production. It helps companies maintain their resources while controlling time and costs to ensure maximum efficiency of the manufacturing process, the utilities and related facilities. Maintenance can lead to less production interruptions which in turn can minimize costs.

Maintenance activities are related with repair, replacement and service of components or some identifiable group of components in a manufacturing plant so that it may continue to operate at a specified 'availability' for a specified period. Thus maintenance management is associated with the direction and organisation of various resources so as to control the availability and performance of the industrial unit to some specified level.

Thus maintenance management may be treated as a restorative function of production management which is entrusted with the task of keeping equipment/machines and plant services ever available in proper operating condition. The minimization of machine breakdowns and down time has been the main objective of maintenance but the strategies adopted by maintenance management to achieve this aim have undergone great changes in the past.

- (i) Outline **THREE (3)** most common causes of equipment failures. (6 marks)
- (ii) The breakdown record of Matta Manufacturing Sdn Bhd for the past 24 months is tabulated in **Table Q2(b)**. The company incurred a cost of RM750.00 each time the machine broke down. A scheduled preventive maintenance approach has been proposed to resolve the problem. This new approach would cost RM450.00 per month and the number of breakdown is limited to an average of once per month.

Table Q2(b): Maintenance record at Matta Manufacturing Sdn. Bhd.

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

Analyse whether Matta Manufacturing Sdn Bhd should use the preventive maintenance approach or not. Justify the answer.

(9 marks)

-END OF QUESTIONS-

