First Semester Examination
2023/2024 Academic Session

Februari 2024

EPM 321 – Manufacturing System
(Sistem Pembuatan)

Duration: 3 hours
(Masa: 3 jam)

Please check that this examination paper consists of FIVE (5) pages of printed material before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi LIMA (5) muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

Instructions : Answer **ALL FIVE (5)** questions.

*[**Arahan** : Jawab **LIMA (5)** soalan]*

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1. The electronics manufacturing enterprise devises a novel production system comprising three part-fabrication processes, one subassembly process, and one final assembly process; the process flow is illustrated in Figure 1. The enterprise is currently considering two cases with varying batch sizes: Case I, in which the batch unit is fifty, and Case II, in which the batch unit is one hundred. The production consists of 40 hours per week.

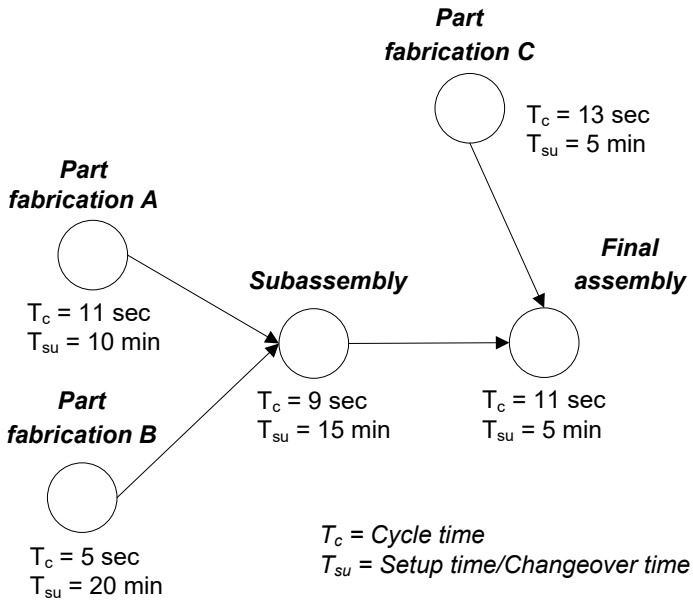

Figure 1

[a] Evaluate how individual cases affect the weekly production capacity.

(30 marks)

[b] Evaluate how individual cases affect the production lead time of 1000 units.

(30 marks)

[c] Calculate the work-in-process in Case II when utilization is 0.80 and availability is 0.90.

(20 marks)

[d] Demonstrate the application of the "Hanedashi" principle.

(20 marks)

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2. TSP Sdn. Bhd. intends to construct a mixed model assembly line with the capacity to produce six units of product A and three units of product B per hour. Repositioning efficiency is 0.95, while uptime efficiency is 0.97. Table 2 presents the time to perform for each work element as well as the precedence relationships among them.

Table 2

	Product A		Product B	
Work element	**Time to perform (Sec)**	**Preceding work element**	**Time to perform (Sec)**	**Preceding work element**
w1	150	-	400	-
w2	150	*w1*	300	*w1*
w3	180	*w2*	300	*w2*
w4	-	-	400	*w3*
w5	230	*w3*	80	*w4*
w6	150	*w5*	250	*w5*
w7	-	-	400	*w6*

[a] Utilize the Kilbridge and Wester method to balance this assembly line and compute its line balance efficiency.

(40 marks)

[b] Calculate the fixed launching rate and sequence of the assembly line's launches, utilizing the line formation and line balance efficiency acquired in 2[a].

(40 marks)

[c] Identify TWO (2) production scenarios in which mixed model assembly may not be appropriate.

(20 marks)

3. [a] VP Bhd. is a manufacturer of testing equipment for semiconductors. The organization implements a job shop (process layout) in its manufacturing processes.

(i) Describe this type of layout with a sketch.

(20 marks)

(ii) Provide TWO (2) justifications why the manufacturer prefers this type of layout.

(10 marks)

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(iii) Provide TWO (2) disadvantages of the layout.

(10 marks)

(iv) Suggest TWO (2) solutions for addressing the disadvantages detailed in 3[a](iii). These solutions are not required to be limited to a single disadvantage.

(10 marks)

[b] A component manufacturer is trying to minimize the component flow by adopting Cellular Manufacturing concept. Based on Table 3[b] which contains the information of the components and the machines that are utilized to produce the components, apply the Rank Order Clustering Technique to group the machines in respective cells.

Table 3[b]

Component	Machine
A	1 & 5
B	4 & 7
C	3 & 6
D	1 only
E	2 & 3
F	1 & 7

(50 marks)

4. Inovate Sdn Bhd has six Group Technology (GT) cells namely G1, G2, G3, G4, G5 and G6. Table 4[a] was produced based on production flow analysis conducted on the shop floor.

Table 4 [a]

	TO					
FROM	*G1*	*G2*	*G3*	*G4*	*G5*	*G6*
G1	0	15	20	0	30	0
G2	20	0	50	0	160	10
G3	0	50	0	30	0	30
G4	30	60	20	0	70	0
G5	40	0	0	10	0	60
G6	0	0	30	20	50	0

[a] Optimize the sequence of these GT cells.

(60 marks)

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[b] Evaluate the performance of these GT cells based on the following criteria.

(i) Repeating Moves
(ii) In-Sequence Moves
(iii) By-passing Moves
(iv) Back-tracking Moves

(40 marks)

5. [a] Examine FOUR (4) differences between an Automated Production Line and an Automated Assembly Line.

(40 marks)

[b] Recommend FOUR (4) factors to ensure that an Automated Production Line operates smoothly.

(40 marks)

[c] List TWO (2) control functions of the Automated Production Line. Predict the situation if the control functions fail.

(20 marks)

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