**Section: A**

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| **Q1:** | **Question 1 (14 marks)**    Litten Pte Ltd manufactures a few models of high quality home furniture. Recently, there has been an increase in the number of complaints from the workers on the difficulties that they faced when trying to move some of the goods (especially the bulkier ones) from one location to another in the factory.  To improve the situation in the factory, James as the factory manager has decided to perform a thorough facilities planning and redesign.  1a)i. According to the Facilities Planning Hierarchy, what are the **THREE** key aspects under “Facilities Design”? (3 marks)  1a)ii. Which **ONE** key aspect under “Facilities Design” that James will need to focus more in this case? (1 mark) | **Mark (4)** |
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|  | Word Count: 21 | Max Words: 100 |

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| **Q2:** | 1b)  When trying to evaluate how to improve the factory, state **THREE** dimensions for facilities planning improvement that James should consider. Give **ONE** example of improvement **FOR EACH** dimension. (6 marks) | **Mark (6)** |
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|  | Word Count: 75 | Max Words: 200 |

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| **Q3:** | 1c) James decided to evaluate the manufacturing facility for two types of products: Product A and Product B. Below are their characteristics:           Product A: Very high production volume, product customisation is not allowed.         Product B: Fairly low production volume, product customisation is allowed.    1c)i. Based on the characteristics above, suggest the most suitable basic layout type that James should implement for Product A. Explain the reason. (2 marks)  1c)ii. Based on the characteristics above, suggest the most suitable basic layout type that James should implement for Product B. Explain the reason. (2 marks) | **Mark (4)** |
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|  | Word Count: 104 | Max Words: 100 |

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| **Q4:** | **Question 2 (13 marks)**    Eren is trying to decide on the ideal location for a new warehouse for his company.  ***Show your workings or reasoning*** *clearly, round your answers to* ***two decimal places*** *when appropriate.*  2a) Table 2a shows a table that Eren has come up with using one of the analysis techniques that he has learnt.    C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-1740916070_1951836745.jpeg    2a)i. What is the name of this analysis technique that Eren is using? (1 mark) | **Mark (1)** |
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|  | Word Count: 4 | Max Words: 100 |

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| **Q5:** | 2a)ii. Find the values of (X), (Y) and (Z). (6 marks) | **Mark (6)** |
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|  | Word Count: 15 | Max Words: 100 |

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| **Q6:** | 2a)iii. Based on Table 2a, which location should Eren select? Why? (2 marks) | **Mark (2)** |
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|  | Word Count: 38 | Max Words: 100 |

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| **Q7:** | 2b) To be sure, Eren tried to use Analytic Hierarchy Process to help him decide on the best location. Figure 2a shows a chart which Eren eventually derived to show all the priority values.    C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_1684090836_2022128009.jpeg    2b)i. What should be the value of (V) as shown in Figure 2a? (2 marks) | **Mark (2)** |
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|  | Word Count: 8 | Max Words: 100 |

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| **Q8:** | 2b)ii. What should be the value of (W) as shown in Figure 2a? (2 marks) | **Mark (2)** |
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|  | Word Count: 8 | Max Words: 100 |

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| **Q9:** | **Question 3 (23 marks)**  Ravenclaw Pte Ltd manufactures various types of children toys. The company is currently planning the layout for their new factory. Luna and her team has come up with the relationship chart for the production floor of the new factory as shown in Table 3a.  ***Show your workings or reasoning*** *clearly, round your answers to* ***two decimal places*** *when appropriate.*    *C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_1924831823_-1411925552.jpeg*    3a) Is the relationship assignment in the Relationship Chart in Table 3a appropriate? Explain and provide complete evidence to support your answer. (3 marks) | **Mark (3)** |
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|  | Word Count: 76 | Max Words: 250 |

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| **Q10:** | 3b) Luna obtained the Closeness Values Table as shown in Table 3b and Total Closeness Rating Table as shown in Table 3c.    C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_321623625_-1581664407.jpeg    C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_321623625_-1777602921.jpeg    3b)i. What is the value of (Q)? (2 marks) | **Mark (2)** |
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|  | Word Count: 2 | Max Words: 100 |

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| **Q11:** | 3b)ii. What is the value of (R)? (1 mark) | **Mark (1)** |
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|  | X | |
|  | I | |
|  | O | |
|  | E | |

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| **Q12:** | 3b)iii. What is the value of (S)? (2 marks) | **Mark (2)** |
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|  | Word Count: 10 | Max Words: 100 |

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| **Q13:** | 3c) After some discussions with her manager, it turned out that Luna had to redo her Total Closeness Rating Table to include new considerations and inputs from her manager. Luna’s new TCR values for the 7 departments is now as shown in Table 3d.    C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_1350920619_884749172.jpeg    The first step in using Graph Based Method is to choose the first 4 departments as starting nodes. Based on Table 3d, list down any **TWO** departments to be included in the starting nodes. Explain the reason. (3 marks) | **Mark (3)** |
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|  | Word Count: 21 | Max Words: 100 |

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| **Q14:** | 3d) After Luna is done with Graph Based Method, state and explain **ONE** principle of flow planning that she needs to consider. (2 marks) | **Mark (2)** |
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| **Q15:** | 3e) Luna is now drawing her layout using AutoCAD Architecture 2018. She just drawn 4 separate lines: line A, line B, line C, and line D to make a rectangle. Now she wants to select the lines as shown in Figure 3a.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-580717678_1848034121.jpeg  If she does the selection (shaded in blue) as shown in Figure 3a, which line(s) will be selected? Explain the reason. Note that as shown in Figure 3a, the original square has 4 separate lines: A, B, C, and D. (2 marks) | **Mark (2)** |
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|  | Word Count: 62 | Max Words: 100 |

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| **Q16:** | 3f) Luna wants to duplicate her square from 1 square to a total of 4 squares as shown in Figure 3b.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-2066146883_1742843801.jpeg  3f)i. What is the AutoCAD command that Luna should use? (1 mark)  3f)ii. When using the command you mentioned in Question 3fi above, which corner(s) of the original square that Luna should use as base point? (As shown in Figure 3b, the original square has 4 corners: A, B, C, and D.) (2 marks) | **Mark (3)** |
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|  | Word Count: 5 | Max Words: 100 |

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| **Q17:** | 3g) Luna found out that Department 1 will consist of 5 cutting machines. If the dimension of a cutting machine is 2m x 1m (length x width), what is the minimal space requirement for Department 1 without aisle space? (2 marks) | **Mark (2)** |
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|  | Word Count: 7 | Max Words: 100 |

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| **Q18:** | 3h) The company informed Luna that they plan to operate 3 shifts in the new production floor and will hire a total of 930 operators to be equally divided among the 3 shifts (shift A, B, and C). The company will also have 100 administrative and management staff working in shift A. In total, how many people are needed to be trained as first-aider for this factory according to the MOM’s Workplace Safety and Health (First-Aid) Provisions? (3 marks) | **Mark (3)** |
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|  | Word Count: 55 | Max Words: 200 |

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