Private & Confidential

FACULTY OF BUSINESS

FINAL EXAMINATION

Student ID (in Figures)	:	
Student ID (in Words)	:	

Course Code & Name	:	**LSC2503 Six Sigma**
Semester & Year	:	September – December 2021
Lecturer/Examiner	:	Wan Ahmad Asrar Nik @ Wan Yahya
Duration	:	3 Hours

INSTRUCTIONS TO CANDIDATES

1. **This question paper consists of 2 parts:**
   PART A (60 marks) : FIFTEEN (15) short answer questions. Answers are to be written in the Answer Booklet provided.
   PART B (40 marks) : FOUR (4) essay questions. Answers are to be written in the Answer Booklet provided.
2. **Candidates are not allowed to bring any unauthorised materials except writing equipment into the Examination Hall. Electronic dictionaries are strictly prohibited.**
3. **This question paper must be submitted along with all used and/or unused rough papers and/or graph paper (if any). Candidates are NOT allowed to take any examination materials out of the examination hall.**
4. **Only ballpoint pens are allowed to be used in answering the questions, with the exception of multiple choice questions, where 2B pencils are to be used.**

WARNING: The University Examination Board (UEB) of BERJAYA University College regards cheating as a most serious offence and will not hesitate to mete out the appropriate punitive actions according to the severity of the offence committed, and in accordance with the clauses stipulated in the Students' Handbook, up to and including expulsion from BERJAYA University College.

Total Number of pages = 4 (Including the cover page)

PART A **: SHORT ANSWER QUESTIONS (60 MARKS)**
INSTRUCTION (S) **:** Answer all **FIFTEEN (15)** short answer questions.
Write your answers in the Answer Booklet (s) provided.

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1. Define Six Sigma. Briefly explain where the term originates.
(2 marks)
2. Briefly explain DMAIC methodology.
(5 marks)
3. List the **FOUR (4)** key metrics on which Six Sigma is focused.
(4 marks)
4. Define the voice of the customer (VoC). Briefly describe **THREE (3)** key approaches to gathering customer information.
(4 marks)
5. List the **SEVEN (7)** wastes.
(7 marks)
6. Define Kanban and briefly explain why it is used in lean systems.
(2 marks)
7. Define Kaizen and briefly explain why it is so important for successful lean production.
(2 marks)
8. Define process capability and briefly explain how process capability can be improved.
(2 marks)
9. State **FIVE (5)** ways how customers perceive quality.
(5 marks)
10. List the **TWO (2)** most widely used ISO standards, and briefly explain why they are so popular?
(3 marks)
11. Define critical-to-quality (CTQ). Provide **THREE (3)** relevant examples.
(4 marks)
12. Briefly describe **FIVE (5)** types of diagram used in Six Sigma implementation.
(5 marks)
13. List the **FIVE (5)** dimensions of Garvin's Product Quality.
(5 marks)
14. List **Five (5)** steps of Juran's 10 Steps to Quality Improvement.
(5 marks)
15. List **FIVE (5)** principles of Deming's 14 Principles.
(5 marks)

Total: 60 marks

END OF PART A

PART B **: ESSAY QUESTIONS (40 MARKS)**
INSTRUCTION(S) **:** Answer all **FOUR** (**4**) essay questions.
Write your answers in the Answer Booklet (s) provided.

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1. a) Assume that A & B Express expects the standard delivery time is within 3 day to 5 days. The branch manager wants to know how many percent of the deliveries were operating at 3 sigma. Therefore, he picked up randomly 20 delivery data of the previous week. The data are 3, 4, 3, 5,5, 4, 3, 6, 6, 2, 3, 4, 4, 5, 3, 3, 5, 6, 3 and 4 days respectively.
   i. Calculate the mean, standard deviation and show the normal curve with labels.
   ii. Calculate the percentage of all deliveries that were operating at 3 sigma.

   b) Mr. Raymond, owner of MTB Bicycle Rentals, wants to start analyzing his company's quality. For each bicycle rental, there are four types of customer complaints: (a) bicycle not working properly, (b) bicycle wrong size, (c) bicycle uncomfortable, and (d) bicycle broken during operation. During the past week, his company rented 280 bicycles. He received 26 total complaints.
   i. Calculate his company's defect per million opportunities (DPMO) for the past week.
   ii. Determine his company's Six Sigma operating level.

   (10 marks)

2. Design of Six Sigma (DFSS) uses DMADV methodology to predict and avoid errors and defects in product development. Describe DMADV process by providing **FIVE (5)** examples.

   (10 marks)

3. Assume that your restaurant has been facing long wait problem since 2020. Based on your observation, you have found that the causes of the problem are material, equipment, methods and manpower. Show a complete fishbone diagram, identify sub-causes for each cause and then briefly explain the causes and effect relationship.

   (10 marks)

4. Waste exists in demand forecasting, procurement, inventory management and product manufacturing. Explain how Lean Six Sigma can eliminate the seven wastes.

   (10 marks)

Total: 40 marks

END OF EXAM PAPER

APPENDIX 1

Six Sigma Conversion Table

Yield	DPMO	Sigma	Yield	DPMO	Sigma	Yield	DPMO	Sigma
6.6%	**934,000**	**0**	**69.2%**	**308,000**	**2**	**99.4%**	**6,210**	**4**
8.0%	920,000	0.1	72.6%	274,000	2.1	99.5%	4,660	4.1
10.0%	900,000	0.2	75.8%	242,000	2.2	99.7%	3,460	4.2
12.0%	880,000	0.3	78.8%	212,000	2.3	99.75%	2,550	4.3
14.0%	860,000	0.4	81.6%	184,000	2.4	99.81%	1,860	4.4
16.0%	840,000	0.5	84.2%	158,000	2.5	99.87%	1,350	4.5
19.0%	810,000	0.6	86.5%	135,000	2.6	99.90%	960	4.6
22.0%	780,000	0.7	88.5%	115,000	2.7	99.93%	680	4.7
25.0%	750,000	0.8	90.3%	96,800	2.8	99.95%	480	4.8
28.0%	720,000	0.9	91.9%	80,800	2.9	99.97%	330	4.9
31.0%	**690,000**	**1**	**93.3%**	**66,800**	**3**	**99.977%**	**230**	**5**
35.0%	650,000	1.1	94.5%	54,800	3.1	99.985%	150	5.1
39.0%	610,000	1.2	95.5%	44,600	3.2	99.990%	100	5.2
43.0%	570,000	1.3	96.4%	35,900	3.3	99.993%	70	5.3
46.0%	540,000	1.4	97.1%	28,700	3.4	99.996%	40	5.4
50.0%	500,000	1.5	97.7%	22,700	3.5	99.997%	30	5.5
54.0%	460,000	1.6	98.2%	17,800	3.6	99.9980%	20	5.6
58.0%	420,000	1.7	98.6%	13,900	3.7	99.9990%	10	5.7
61.8%	382,000	1.8	98.9%	10,700	3.8	99.9992%	8	5.8
65.6%	344,000	1.9	99.2%	8,190	3.9	99.9995%	5	5.9
						99.99966%	**3.4**	**6**