



Institute of Health Management Research

MBA Hospital and Health Management

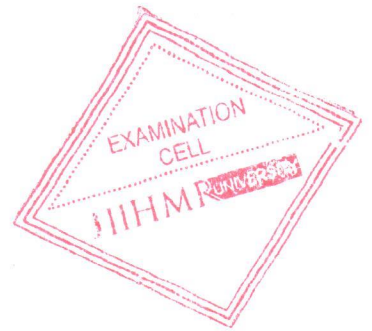
MBA Pharmaceutical Management

Batch-23 (2018-2020)

Elective Course – Lean Six Sigma in Healthcare

Term Examination

January 2020



Time - 3 Hour

MM-70

Roll No. \_\_\_\_\_

The question paper contains **8** printed page.

*Instructions*

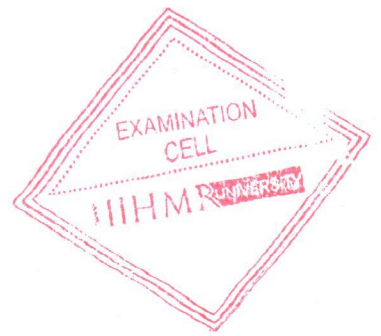
The question paper has two sections – Section A and B. Section A contains **20** objective type (multiple choice questions) of 1 mark each. Please mark your responses in the question paper and attach with the answer script. Section B contains **8** questions, out of which you can attempt any **five** questions (10 marks each).

**Section A – MCQ's**  
(20 marks, 1 mark each)

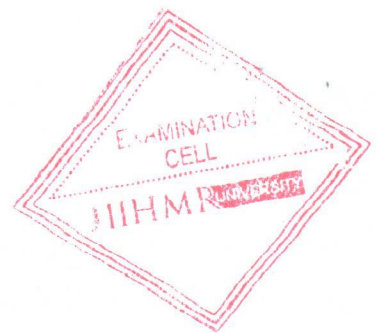
1. Six sigma philosophy is the pioneering work of
  - (a) Juran ☐
  - (b) Bill Smith ☐
  - (c) Taguchi ☐
  - (d) Crosby ☐
2. Deployment of Six Sigma to improve the quality of health care and delivery performance can be through
  - a) DMADV ☐
  - b) DMAIC ☐
  - c) Both a and b ☐
  - d) None of the above ☐
3. Six Sigma strategy as a quality goal sets tolerance levels for errors to
  - a) 3.4 times per million observations ☐
  - b) 5 times per million observations ☐
  - c) 5.4 times per million observations ☐
  - d) 6.4 times per million observations ☐
4. SIPOC provides a view of the process that contain approximately how many steps?
  - a) 16-25 ☐
  - b) 5-7 ☐
  - c) 8-15 ☐
  - d) 25-40 ☐

5. QFD is a planning process for products and services. It starts with
- a) Competitive intelligence ☐
  - b) The voice of customer ☐
  - c) A relationship matrix ☐
  - d) Quality specifications ☐
6. A diamond symbol in Process Map is used for showing a(n) \_\_\_\_\_ point in the process
- a) Ending ☐
  - b) Beginning ☐
  - c) Decision ☐
  - d) Repair station ☐
7. A \_\_\_\_\_ is used to create a model of an effect on an output by the variation in two or more of the inputs
- a) Correlation coefficient ☐
  - b) Linear Regression ☐
  - c) Multiple Regression ☐
  - d) X – Y Diagram ☐
8. Which of the following Six Sigma tools illustrates the dynamic impact of customer needs on customer satisfaction?
- a) Pareto Chart ☐
  - b) Affinity Diagram ☐
  - c) Kano model ☐
  - d) PERT ☐
9. Which of the following statements regarding the Six Sigma team leadership is true?
- a) A Black Belt leads the team through the DMAIC methodology ☐
  - b) A Green Belt is a full time team lead ☐
  - c) A Black Belt typically creates a project charter ☐
  - d) A Green Belt leads a least four projects per year ☐
10. Which of the following statements is true regarding Pareto charts?
- a) It is process of ranking opportunities from smallest to largest ☐
  - b) It is known for “separating the vital few from the useful many/trivial many” ☐
  - c) It is an alphabetical ranking of categories ☐
  - d) None of the above ☐
11. The peak of the bell-shaped curve represents:
- a) The standard deviation ☐
  - b) Process sigma ☐
  - c) The width or flatness of the shape of the distribution ☐
  - d) The mean or the average of the distribution ☐





12. Continuous data is:
- a) data which is counted ☐
  - b) Not preferred, discrete data is best to use whenever possible ☐
  - c) Data that exist on a continuum ☐
  - d) Good/bad, pass/fail, go/no-go ☐
13. Japanese 5S methodology is created and used for:
- a) Continuous Improvement ☐
  - b) Prevent Defects ☐
  - c) Creating a productive work environment ☐
  - d) Reduce Variation ☐
14. A Six Sigma Green Belt practitioner constructs a control chart to display a process mean and its outer limits. In such a chart, what does UCL stand for?
- a) Upper Cycle Length ☐
  - b) Upper Control Limit ☐
  - c) Upper Cycle Limit ☐
  - d) Upper Control Length ☐
15. For a process working at 5 Sigma level, how many opportunities are considered to lie outside of the specification limits provided by the customer?
- a) 233 ☐
  - b) 6210 ☐
  - c) 3.4 ☐
  - d) 66807 ☐
16. Which of the following statements is not true of the null hypothesis?
- a) It is your theory ☐
  - b) It is what you would expect by chance alone ☐
  - c) Assumes things to be equal ☐
  - d) None of the above ☐
17. What is COPQ?
- a) Cost of production quantity ☐
  - b) Cost of poor quality ☐
  - c) Cost of production quality ☐
  - d) Cost of Poor quantity ☐
18. In a SIPOC diagram, what does the P stand for in the acronym?
- a) Process ☐
  - b) Production ☐
  - c) Project ☐
  - d) Pareto ☐

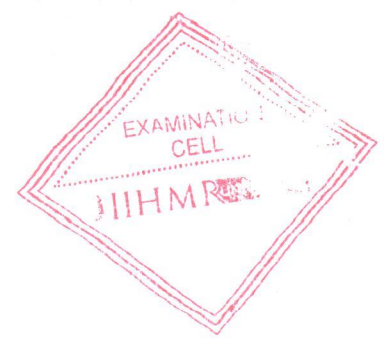


19. Indicate which control chart is the most sensitive in measuring time as data

- (a) p chart ☐
- a) c chart ☐
- b)  $\bar{X}$  R chart ☐
- c) None of the above ☐

20. The process capability of an six sigma process is

- a) 2 ☐
- b) 1.33 ☐
- c) 1.0 ☐
- d) None of the above. ☐



**Section B**  
**(50 marks)**

Attempt any five questions.

- Q. 1.** Explain the DMAIC methodology in Six Sigma. Briefly explain the quality tools within each phase of the DMAIC problem solving methodology.
- Q. 2.** Explain the QFD matrix which could be used to organize the voice of the customer information.
- Q. 3.** Arrange the data into a frequency distribution table having a suitable number of classes.
- |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 10 | 17 | 15 | 22 | 11 | 16 | 19 | 24 | 29 | 18 |
| 25 | 26 | 32 | 14 | 17 | 20 | 23 | 27 | 30 | 12 |
| 15 | 18 | 24 | 36 | 18 | 15 | 21 | 28 | 33 | 38 |
| 34 | 13 | 10 | 16 | 20 | 22 | 29 | 29 | 23 | 31 |

Draw a histogram of the data. Also determine the mean and the standard deviation of the data.

- Q. 4.** Explain in detail the Japanese lean tool - 5S for Healthcare.
- Q. 5.** A hospital while implementing a Six Sigma project gathered data of 200 patient families for 10 months. The number of respondents, together with the calculated proportions, each month who expressed dissatisfaction with the organization's services are shown in table below:

|                  |       |       |     |       |       |      |      |     |      |       |
|------------------|-------|-------|-----|-------|-------|------|------|-----|------|-------|
| Month no.        | 1     | 2     | 3   | 4     | 5     | 6    | 7    | 8   | 9    | 10    |
| No. dissatisfied | 23    | 23    | 20  | 21    | 17    | 22   | 24   | 20  | 18   | 17    |
| Proportion       | 0.115 | 0.115 | 0.1 | 0.105 | 0.085 | 0.11 | 0.12 | 0.1 | 0.09 | 0.085 |

At the end of the 10-month period during which the above data were gathered, changes planned by the project team were introduced. Data for the next 10 months are given in Table below:

|                  |      |      |     |       |      |      |      |     |      |       |
|------------------|------|------|-----|-------|------|------|------|-----|------|-------|
| Month no.        | 11   | 12   | 13  | 14    | 15   | 16   | 17   | 18  | 19   | 20    |
| No. dissatisfied | 10   | 16   | 17  | 15    | 18   | 22   | 13   | 10  | 11   | 11    |
| Proportion       | 0.05 | 0.08 | 0.1 | 0.075 | 0.09 | 0.11 | 0.07 | 0.1 | 0.06 | 0.055 |

Draw the pre-post stages p charts to check for reduction in dissatisfied patient families.

- Q. 6.** In the improve phase of six sigma project, process experimentation with single factor was carried in the process of administering thrombolytic treatment to acute myocardial infarction patients at a hospital. Door to needle time (DTN) is the time from arrival at hospital when the ambulance stops outside the hospital (door) to the start of the thrombolytic treatment (needle) for patients with an acute myocardial infarction. Records show that the process has been behaving in a stable, predictable manner, with DTN being adequately modelled by the normal distribution with mean 19 minutes and standard deviation 6 minutes.

An experiment was conducted over a period of 1 month during which one of a team of specialist nurses, empowered to administer the thrombolytic treatment, was on duty at all times in the accident and emergency department of the hospital. The DTN times for the 25 patients treated during the experimental period was 16.28 minutes.

Does this sample mean represent a 'real' improvement to the process in the sense of a reduction of the population mean DTN for acute myocardial infarction patients from 19 minutes to a new, lower population mean? Check at 5% level of significance.

- Q. 7.** A company takes products from two suppliers, A and B. One year after installation of systems, engineers from the company check the status of the product for wear. From a random sample of 100 service reports the products were categorized according to the supplier and the state of the product, yielding Table.

Table Contingency table of product data.

| Classification of sample of product<br>by bearing supplier and product state |   | Product state |      |     |
|------------------------------------------------------------------------------|---|---------------|------|-----|
|                                                                              |   | Sound         | Worn |     |
| Supplier                                                                     | A | 32            | 3    | 35  |
|                                                                              | B | 48            | 17   | 65  |
|                                                                              |   | 80            | 20   | 100 |

Check whether there is association between supplier and product state. Check at 5% level.

- Q. 8.** Write short notes on any two of the following:
- ( i ). Cause and Effect Diagram & Pareto Chart
  - ( ii ). FMEA
  - ( iii ). Value Stream Map
  - ( iv ). Hypothesis testing and model building

\*\*\*

