Exam Date & Time: 08-Dec-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

MME 3158

FIFTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV- DEC 2023 **TOTAL QUALITY MANAGEMENT [MME 3158]**

Marks: 50		Duration: 180 min
	Α	
Answer all	the questions.	
Instructions	s to Candidates: Answer ALL questions Missing data may be suitably assumed	
1)	Differentiate between products and services.	
		(2)
A)		

B)	Explain briefly, Failure costs, Appraisal costs and Prevention costs with reference to any product	
	industry.	(3)

C)

The frequency distribution of width of certain components is shown in the table below:

Width (cm)	Number of	
. ,	components	
2.0-2.4	4	
2.5-2.9	6	
3.0-3.4	14	
3.5-3.9	20	
4.0-4.4	25	
4.5-4.9	36	
5.0-5.4	40	
5.5-5.9	28	
6.0-6.4	16	
6.5-6.9	7	
7.0-7.4	4	
7.5-7.9	3	

Compute Sample mean and Median of the distribution. What percentage of the actual distribution falls outside the limits 3.2 cm and 6.7 cm?

2) Describe Type I error and Type II error with regard to control charts for variables. How they are minimized?

A) B)

- Consider any one of the business organizations listed below and discuss at-least eight characteristics that successful quality leaders of that organization need to demonstrate.
 - (i) Automobile manufacturing unit
 - (ii) An Airline
 - (iii) Home appliances production unit
- C) A process has demonstrated that when held in control it can maintain a σ of 0.15cm. A certain part has (4) specifications of 15 ± 0.5 cm.

(i) Using a target mean of 15 cm find control limits for \overline{X} and R charts based on a subgroup size of 6 units.

In answering the following questions, assume that the actual mean setting μ is 14.97 cm.



(3)

(5)

(3)

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	(ii) What percentage of units would you expect to meet specifications, assuming the process generates approximately normal distribution of measurements?	
	(iii) What is the probability of detecting the shift in the mean?	
3)	Discuss the concepts of ISO 14001. List the benefits of Environmental Management System.	
A)		(3)
B)	Sketch and explain the Cause and Effect diagram with an example.	(3)
C)	Manufacturer A produces a metal piece, the dimension of which is normally distributed with a μ of 9.500 inch and \overline{R} of 0.150 inch based on a subgroup size of 5. Manufacturer B produces a second metal	
	piece with μ of 7.500 inch and \overline{R} of 0.050 inch based on a subgroup size of 8. Company C purchases these two parts and assembles them together to obtain a combined dimension of 17.000 inch. What percent of the combined assemblies would you expect to have a dimension in excess of 17.10 inch?	(4)
4)	How Overall Equipment effectiveness (OEE) is computed with regard to the implementation of TPM in an organization?	(3)
A)		
B)	Explain: (j) Failure rate (ii) ATI (iii) Product rule	(3)
C)	A Double sampling plan is as follows: $n_1 = 30$, $c_1 = 1$, $n_2 = 60$, $c_2 = 3$. Compute the Producer's risk at a fraction defective of 0.02. Assume incoming lot size is large in comparison with sample size.	(4)
5)	Describe the construction of R chart, p chart and u chart. How they are useful to quality control?	
		(3)
A) B)	Sketch and explain the Prioritization matrices with an example	
D)	Skown and explain the i nontization induloes with an example.	(4)

C)

The table given below shows the number of defects observed on lots of 10 miniature worm gear drives drawn daily from the line. This is a pilot production run lasting 20 days. Compute 3-sigma trial control limits for a *c* chart. If the causes for out of control situation are known and eliminated, recommend the central line and control limits for future production.

Lot Number	Number of defects	Lot Number	Number of defects
1	14	11	16
2	16	12	12
3	18	13	6
4	10	14	10
5	7	15	5
6	16	16	8
7	8	17	14
8	9	18	9
9	4	19	3
10	25	20	8

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(3)