



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech(IEM)/SEM-2/IEM-202/2011

2011

QUALITY ENGINEERING & MANAGEMENT

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any *five* questions.

5 × 14 = 70

1. a) What are meant by Six Sigma and value enrichment ?
Do you agree that value can truly be enriched through
the practice of Six Sigma ? 7
- b) Six Sigma methodology needs the use of DMAIC.
Elaborately discuss DMAIC and explain each of the
elements. 7
2. a) Illustrate 'Quality Function Deployment' Model using an
example. 7
- b) Elucidate FMEA and its usefulness in industry. 7



3. a) Explain the terms 'Treatment condition', 'Design Matrix' and 'Degree of Freedom'. 9
- b) Determine minimum number of 'Treatment conditions' required for the following experiment : 5
- 5 Factors *A, B, C, D, E*
- 2 Interactions *AE, BC* and *CD*
- 2 Levels of each factor.
4. a) What are the benefits of ISO registration ? Describe the ISO 9000 family of standards. Also discuss how over the years standards have been modified. 11
- b) Briefly discuss incoming, inprocess and outgoing inspection methods in a manufacturing unit. 3
5. a) From the following data recorded during production inspection of an item determine,
- i) Mean
- ii) UCL
- iii) LCL



- iv) Plot the graph in \bar{X} and R charts showing whether the process is under control or not.

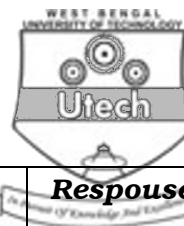
Sl. No. of Observations	Individual Measurements		
	I	II	III
1	15.35	15.40	15.75
2	15.25	15.50	15.60
3	15.45	15.35	15.38
4	15.41	15.42	15.74
5	15.38	15.26	15.70
6	15.26	15.61	15.73
7	15.32	15.60	15.50
8	15.30	15.54	15.55
9	15.31	15.28	15.47
10	15.71	15.39	15.36

The values of factors A_2 , D_3 and D_4 for three items observation per draw are 1.023, 0 and 2.575 respectively. 11

- b) What is the difference between 'Attribute' and 'Variable' with respect to quality control charts. 3

6. Following table compiles the data of a chemical process for reaching your conclusion :

Level	Factor :	Temp.	Catalyst Grade	Reaction Time
1		75 cal	4	50 secs
2		90 cal	6	40 secs



Orthogonal Array is given below :

Treatment	Melt Temp.	Melt Flow	Pressing Time	Response
1	1	1	1	16
2	2	1	1	18
3	1	2	1	24
4	2	2	1	26
5	1	1	2	20
6	2	1	2	20
7	1	2	2	22
8	2	2	2	30

- 7 a) Twenty samples of size 100 units each were collected in a high pressure valve manufacturing unit over a period of ten days. The number of defective components found in the samples are presented below :
- 6, 7, 4, 9, 5, 4, 6, 10, 3, 4
1, 4, 0, 8, 11, 5, 9, 2, 1, 7
- Prepare the stable fraction defective p-control chart from the above data. 8
- b) What type of control chart should be used for multiple types of defects in each unit of a product in a foundry ? Elucidate the method of determining the mean and control limits in this respect. 6
8. Write short notes on any *two* of the following : 7 + 7
- Affinity diagram and interrelationship diagram
 - Acceptance sampling and OC curve
 - Quality circle
 - Kaizen in TQM
 - Cost of Quality
 - Process capability and zero defect.