S8PM 2005 QUALITY ENGINEERING AND MANAGEMENT– TEST I

Time: 50 minutes, Max marks: 30

Use of Statistical Tables is permitted. Choose a significance level of 0.05

1) Discuss the various definitions of Quality.

(5 marks)

2) Differentiate between Mission, Vision and Quality statements. Give examples.

(5 marks)

3) Two different hardening processes, saltwater quenching and oil quenching, are used on samples of a metal alloy and the results are as follows:

Oil	146	148	147	134	140	138	149	143	144	138		
Saltwater	153	139	151	150	151	152	147	153	148	152	149	150

Prepare boxplots comparing the two processes on a graph sheet and give your conclusions.

(5 marks)

4) The diameter of a metal rod is measured by 10 inspectors, each using a micrometer and a vernier, with the following results. Is there a difference between the mean measurements of the two types of instruments?

Micrometer	10.2	10.22	10.2	10.21	10.19	10.21	10.21	10.19	10.2	10.22
Vernier	10.19	10.21	10.2	10.22	10.19	10.19	10.2	10.18	10.18	10.22

(5 marks)

5) What are the deficiencies of one factor at a time experiments? Illustrate with an example.

(5 marks)

6) An experiment involved flame testing fabrics after applying fire-retardant treatments. The four factors considered are type of fabric (A), type of fire-retardant treatment (B), laundering condition (C—the low level is no laundering, the high level is after one laundering), and method of conducting the flame test (D). All factors are run at two levels, and the response variable is the inches of fabric burned on a standard size test sample. Estimate the effects and interactions from the following data:

A	B	C	D	Response
-1	-1	-1	-1	42
1	-1	-1	-1	31
-1	1	-1	-1	45
1	1	-1	-1	29
-1	-1	1	-1	39
1	-1	1	-1	28
-1	1	1	-1	46
1	1	1	-1	32
-1	-1	-1	1	40
1	-1	-1	1	30
-1	1	-1	1	50
1	1	-1	1	25
-1	-1	1	1	40
1	-1	1	1	25
-1	1	1	1	50
1	1	1	1	23

(10 marks)

7) The viscosity of a polymer is measured hourly. Measurements for the last 10 hours are shown as follows:

Test	1	2	3	4	5	6	7	8	9	10
Viscosity	2838	2785	3058	2878	2920	3050	2870	3174	3102	2762

Does the viscosity follow a normal distribution? Make a normal probability plot on ordinary graph paper and judge.

(5 marks)