

B. Tech Degree VII Semester Examination November 2005

ME 705 (C) STATISTICAL QUALITY CONTROL

(2002 Admissions onwards)

Time : 3 Hours Maximum Marks : 100

(Use of SQC tables is permitted)

I. (a) Discuss the terms variable and attributes. (5)

(b) Table gives the compressive strength to the nearest gm of 50 samples of a metal spring :

72	22	81	41	104	79	48	74	34	75
97	66	37	44	88	6	62	50	43	31
21	171	94	52	12	116	16	36	57	54
14	59	24	68	32	50	27	18	18	77
45	63	32	27	59	8	58	30	15	26

(i) Arrange the data in groups of 0<20, 20<40, 40<60 gm and so on.

(ii) Calculate the mean, median and mode compressive strength.

(iii) Find also the range, SD, and the semi-interquartile range. Which of these measures of the dispersion would be more suitable in this case? (12)

(c) A die is loaded in such a way that each odd number is twice as likely to occur as each even number. If E is the event that a number greater than 3 occurs on a single toss of the die, find probability of E, i.e. P(E). (3)

OR

II. (a) Explain the following terms :

(i) Ogive curves (ii) Normal distribution

(iii) Measures of dispersion. (3 x 3 = 9)

(b) Find the probability of randomly drawing two aces in succession from an ordinary deck of 52 playing cards (i) if we sample without replacement, and (ii) if we sample with replacement. (2 x 1 ½ =3)

(c) Discuss the following distribution :

(i) Binomial distribution (ii) Poisson distribution (2 x 4 = 8)

III. (a) What is a control chart? What are the uses of control chart? (8)

(b) Plot the control charts for $\bar{X}$ and R, using the following sample data on a sample size of five. Find whether the process is in control.

Sub group No.	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	15.72	15.31	15.02	15.06	15.93	15.01	15.71	15.72	15.04	15.47
R	0.04	0.03	0.05	0.01	0.08	0.09	0.05	0.03	0.01	0.08

(12)

OR

IV. (a) Distinguish between P chart, nP chart and c, chart. Discuss some situations in which these charts are most applicable. (8)

(Turn Over)

(b) What is meant by process capability and how it is determined? (5)

(c) The castings were inspected in order to locate defects in them. Every casting was found to contain certain number of defects as shown below. It is required to plot a c - chart and draw the conclusions.

Casting	1	2	3	4	5	6	7	8	9	10
No. of defects	7	0	3	4	5	6	6	4	2	2

(7)

V. (a) Explain producer's risk and consumers risk. (8)

(b) Write short notes on :

(i) Double sampling plan (ii) ATI curve. (6)

(c) In a double sampling plan N = 5000, n = 100, $C_1 = 0$, $n_2 = 100$ and $C_2 = 1$. Use Poisson's table to compute the probability of acceptance of 1% defective lot. (6)

OR

VI. (a) Explain the term AOQL and LTPD. (6)

(b) Describe briefly sequential sampling plan. (4)

(c) A single sampling plan gives N = 5000, n = 100 and c = 2.

(i) Compute the probability of acceptance of lots with 1% defective.

(ii) Find the AOQ value.

(iii) Determine the average percent inspection. (10)

VII. (a) Define the term MTBF and MTTR. (5)

(b) Sketch and explain bath tub curve in reliability. (5)

(c) A certain type of electronic component having a uniform failure rate, has a mean life of (MTBF) 5000 hours. What is the reliability associated with a specified service period of 200 hours? (10)

OR

VIII. (a) Give a brief account of cost of reliability and designing for reliability. (8)

(b) An element has a probability of successful operation over a given period of 60 percent. If four such elements are connected in parallel estimate the improvement factor. If the same system connected in series what are the achieved limit. (12)

IX. (a) How quality circles are organized? How it shall influence the quality? (10)

(b) What are the various features of TQM? (10)

OR

X. (a) Explain the zero defect concept. (10)

(b) Describe the ISO : 9000 series standards in general. What are its benefits? (10)

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