MECHANICAL ENGINEERING DEPARTMENT

Major Test Question Paper

Subject : Quality Assurance : MEL 752

Time Allowed : 2 Hrs. Max. Marks : 40

Attempt all questions

Q 1 State briefly :

a) What are the different steps in Total Quality Control? What are the challenges in a TQC program which a manager has to address?

b) How does effective on-line quality control reduce the fraction defective of the process? What is its effect on various quality related costs?

c) What type of control chart would you recommend (and why) if it is required to detect minute and sustained shifts in the process setting quickly?

4+3+3=10 marks

Q 2 a) What is the significance of Average Outgoing Quality Limit (AOQL) and Average Total Inspection (ATI) in a sampling plan ?

b) Annual production of a certain part is 100,000 and it is made in lots of 2000. Average percent defective of the process is 1%. It is required to compare the economy of i) 100 % inspection ii) No inspection , and iii) Dodge Romig 2 % AOQL single sampling plan : $n = 65$, $c = 2$.

Assume that 100 % inspection will eliminate only 95 % of unsatisfactory parts due to inspection fatigue. Also assume that inspection will find and eliminate all defective parts in the rejected lots under the AOQL plan. Unit cost of inspection is 0.15. Average cost of replacing a defective item (reworking + scrapping) during inspection is 1.50. Any defective part entering the assembly department will be finally discovered and eliminated at an estimated cost of 8.0 per part.

Determine the minimum cost solution.

4+6 = 10 marks

Please turn over

Q 3 a) Describe a suitable sampling plan to arrive at the decision of lot acceptance or rejection on the basis of minimum number of items inspected.

b) A proposed double sampling plan is as follows :

Sample No.	**Sample size**	**Acceptance No.**	**Rejection No.**
1	2	0	2
2	2	1	2

Plot OC and AOQ curves of this plan, assuming that the lot is very large in size. Also determine average outgoing quality limit (AOQL). What do you think of the quality protection given by this plan ?

4+6 = 10

Q 4 Differentiate between the following :

a) Type I *and* Type II errors

b) Process control *and* Process capability

c) Conventional $\overline{\overline{X}}$ chart *and* Reject limits $\overline{\overline{X}}$ chart

d) c chart *and* demerit chart

e) p charts with constant *and* variable subgroup size

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