MECHANICAL ENGINEERING DEPARTMENT

MAJOR TEST QUESTION PAPER

SUBJECT: MCL 134 (Quality Assurance Part)

ANSWER ON SEPARATE ANSWER-BOOK

MAX MARKS : 20

Q 1. A certain product has been statistically controlled at a process average of 36.0 and a standard deviation of 1.00. The product is presently being sold to two users who have different specification requirements. User A has established specifications of 38.0 ± 4.0 for the product, and user B has specifications of 36.0 ± 4.0. Assuming that the two users' needs are equal, a suggestion is made to shift the process target to 37.0.

   a) At the present process set-up and proposed target value, what percent of the product will not meet the specifications of the user A and the user B?

   b) Do you think that this shift to a process target of 37.0 would be desirable? Explain your answer. State the assumption made.

   5 marks

Q 2. Twenty five feet reels of wire are wound automatically from a continuous source of wire. The standard deviation for the cutting operation has been found to remain constant at 0.50 ft. Reels are checked every hour in subgroups of size nine. The user of these reels has purchase specification of 25 ± 1 feet, but he is really concerned about short reels.

   a) What target value should be set by the manufacturer to ensure that 99.9% of the reels meet the minimum specification? State the assumption made.

   b) What is the probability of Type II error for $\bar{X}$ chart if the process average increases by 1% ?

   5 marks

Q 3. A common double sampling plan is as follows :

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

(** indicates that rejection is not permitted on first sample)

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 ?

   5 marks

Q 4. Differentiate between:

   a) ASS Curve *and* ATI Curve
   b) Acceptance Rejection *and* Acceptance Rectification Plans

   5 marks

MCL134 – METROLOGY and QUALITY ASSURANCE
(I Semester 2017-18)
<u>Major</u>

Max.Marks:40
Time :2 Hrs.

Instructions:
1. The question paper contains two parts. Answer them separately in two different answer sheets.
2. Write your name, entry no. and group no. on the front page of both the answer sheets.
3. Be brief and specific in your answers. Draw suitable sketches wherever required.

Section A: Metrology

1. (a) Define "Lay" in surface finish measurements. What is its significance? Indicate the lay for any three manufacturing processes. (3)

   (b) Sketch and explain Taylor Hobson Talysurf for the measurement of surface finish. (2)

2. (a) What are all the different elements of spur gear which require inspection? (2)

   (b) Describe gear tooth vernier caliper used for inspection of gears. Calculate the settings for a straight spur gear having 50 teeth of module 3 mm. (3)

3. (a) Give the set of thread gauges required for measuring internal threads (2)

   (b) What is the effective diameter or pitch diameter of a screw thread? Derive an expression for calculating the effective diameter of external threads using two wire method. (3)

4. (a) Distinguish between the positional and feature inspection. (2)

   (b) Describe the tests conducted to obtain the parallelism and squareness between all combinations of axes and surfaces. (3)

Section B: Quality Assurance

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