

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 and any five of the remaining seven questions

The figures in the right-hand margin indicate marks
Probability distribution statistical tables may be supplied

1. Answer in brief the following : 2 x 10
- With respect to inspection explain the terms systemic error and chance error.
 - Explain the difference between interchangeable assembly and selective assembly.
 - State Taylor's principle of limit gauging.
 - Explain fundamental deviation.
 - Differentiate between roughness and waviness.
 - Explain what is meant by quality assurance.

(Turn Over)

(2)

- Differentiate between sample and universe. How is sample mean and standard deviation related to that of the universe.
- Explain the terms Acceptable quality level and Rejectable quality level.
- Define Reliability.
- Explain how reliability is related to cost.

2. A fit is designated as $25 H_7/d_7$

- Sketch the tolerance disposition for the hole and shaft for the fit. 2
- Change the basis of the fit and show the tolerance disposition. 2
- Determine the dimensions of the hole and shaft of the fit. 3
- Determine the dimensions for the gauges for checking the hole and shaft. Data given. 3

Diametral step = $18 - 30$

IT 7 = $16 i$

IT 8 = $25 i$

Fundamental Deviation = $-16 D^{0.44}$

M.Tech-1/IAQA (Set-2)

(Continued)

(3)

- Discuss the basic features of measurement of surface roughness by M -system and E -system. 4
 - Derive an expression for the best wire size for inspection of V -threads. Hence derive an expression for change in effective diameter due to error in pitch and thread angle. 6
- With respect to inspection of gears explain the different methods of expressing error in pitch. 4
 - Describe in detail the base tangent method of gear inspection. 6
- Explain briefly the objective of quality control in an industry. 4
 - Control charts for \bar{X} and σ are maintained for a process. The sub group size is 10. After 18 subgroups $\Sigma\sigma = 8.24$ and $\Sigma\bar{X} = 595.8$. Compute the 3-sigma limits for \bar{X} and σ charts. For $n = 10$ assume $c_2 = 0.9227$. 6

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(Turn Over)

(4)

- Explain what is the operating characteristic curve (OQL). Discuss different types of (OQL) curves and their features. 2
 - In a double sampling 2% AOQL acceptance rectification plan

Sample size $n = 1000$

First lot size $n_1 = 32$

Acceptance number

for first lot $c_1 = 0$

Second lot size $n_2 = 38$

Maximum number of defectives

allowed in the combined 1st and

second lot sizes $c_2 = 2$

Determine

- Probability of acceptance of a 2% defective lot
- The average total inspection. 8

- What are three categories of failure? Draw a graph showing number of failures versus time. How each is taken care of in design? 5

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(Continued)

(5)

- What is the condition for successful operation of a system comprising of n units connected in series? What is the probability of the system to function satisfactorily when each unit is (i) independent of other (ii) units are not independent. 5

8. Write notes on : 10

- Surface roughness measurement by talysurf
- Hazard models.

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BE - 100