

Set-1

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

1. Answer in brief the following : 2×10
- Differentiate between precision and accuracy.
 - Explain the difference between gauging and inspection.
 - Define hole basin and shaft basin systems of fit.
 - Differentiate between tolerance and allowance.
 - With reference to surface roughness explain the terms lay and meter cut off.
 - Define quality.

(Turn Over)

(2)

- With reference to quality control explain the terms attributes and variables.
 - Define the terms producer's risk and customer's risk.
 - Explain what is understood by failure of an item with a suitable example.
 - Define the terms maintainability and serviceability.
2. A fit is specified as $40 H_8/s_7$
- Sketch the tolerance disposition of hole and shaft for the fit. 2
 - Change the basin of the fit and show the tolerance disposition. 2
 - Determine the dimensions of the hole and shaft for the fit. 3
 - Determine the dimensions of the gauges for checking the hole and shaft for the fit. 3

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(Continued)

(3)

Data given :

Diametral step	- 30 - 50
IT 6	- 10 μ
IT 8	- 25 μ
IT 9	- 40 μ

Fundamental Deviation - IT 8 + 1 to 4.

- Name the mechanical and physical properties which are affected by the surface roughness of a part. 4
 - Describe 3-wire method of measurement of effective diameter of V-threads. 6
- With respect to gears explain what is meant by composite error. 2
 - Describe how tooth thickness of gears can be measured. 8
- Enumerate in detail the factors that affect the quality of a component. 4
 - Control charts for \bar{X} and R are maintained for control of an important dimension of a

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(4)

- component. The sub-group size is 5. The values of \bar{X} and R are computed for each sub-group and the values of $\Sigma \bar{X}$ and ΣR for 25 sub-groups are found to be 614.8 and 120.0 respectively. Compute the values of 3-sigma limits for the \bar{X} -chart. Assume $R = 2.326 \sigma'$ where σ' is the standard deviation of population. 6
6. (a) Discuss the different characteristics of O. C. curves. What is the limitation of the O. C. curve? 2
- (b) A lot for inspection contains 1000 items of which 10 are defective. If a sample of 36 items taken from the lot contains 0 defective the lot is accepted, if there are 1, 2 or 3 defectives in the first sample a second sample of 59 items one taken and if the total number of defectives in 1st and 2nd samples is less than 3 then the lot is accepted. Calculate the probability of acceptance of the lot. 8
7. (a) What do you understand by the term reliability and why it is required? 5

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(Continued)

(5)

- (b) Derive an expression to determine the failure of a system comprising of n components connected in parallel. Determine the reliability of a system consisting of four identical units connected in parallel each unit having reliability factor of 0.9. Assume that the failure of units are independent of one another. 5
8. Write notes on : 10
- Qualitative methods of determination of surface roughness
 - Selection of sampling plan.

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