Sem V / Metrology & Instrumentation / PROD CCBGS 23-05-16

QP Code : 31128

(3 Hours) **[Total Marks : 80**

Note : 1. Question number 1 is **compulsory**
2. Solve any **Three** questions from remaining **Five** questions
3. **Assume** suitable data if required.
4. Draw neat sketches wherever necessary.

Q.1. **(a)** Answer **any Seven** of the following in 2-3 lines each. Draw figure wherever required. **14**

i) Mention a few important precautions for use of instruments so as to avoid inaccuracies in measurements.

ii) What is a comparator? State the various uses of comparators.

iii) State the role of engineering inspection in mass production workshop.

iv) The Indian standard recommendation is to adopt a hole-basis system. Justify.

v) Pick holes from following list and arrange then in decreasing order of tolerance. Indicate the holes with negative fundamental deviation:

E7, M6, d8, D20, f12, g9, N16.

vi) How Chordal gear tooth thickness measurement method is superior to pitch line method of measurement.

vii) Explain Abbe's alignment principle. Define cosine error.

viii) Define roughness. What are the causes of roughness in a machined surface?

ix) State one advantage & one disadvantage of an adjustable gap gauge when compared with a fixed jaw gap gauge.

(b) Describe in detail the types of screw threads available with ISO system, and explain the principle underlying the designation of these screw threads. **06**

Q.2. **(a)** Describe in brief the construction and working of a ***Sigma comparator*** with the help of a neat sketch. **10**

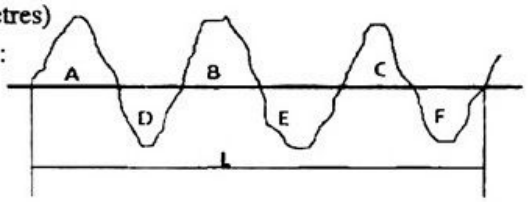
(b) What is meant by the term "Flatness" as applied to metrology? State the characteristic of the surface that is responsible for its interferometric measurement. What are the advantages of laser as a light source in interferomatric measurement? **10**

Q.3. **(a)** State the methods which used for measuring effective diameter. Explain any one of them. What is 'Best size' wire? Derive an expression for the same in terms of the pitch and angle of the thread. **10**

(b) Briefly explain the significance of surface finish evaluation. A rectilinear pen recording of a diamond turned surface is in figure The sampling length (L) used was 0.8 mm and V/H magnification ratio was 5000/100. **10**

Calculate the R_a if the areas (in square millimetres) above and below the mean line are as follows :

A	B	C	D	E	F
60	115	96	92	109	70



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Q.4. (a) Design a workshop type progressive type GO and NO GO limit gauge which is required to check the designation 50H8 g6. 12

50 mm lies between 30-50 mm.

$i = 0.46(D)^{1/3} + 0.001\ D$ (microns)

Fundamental deviation for g shaft = $- 2.5\ D^{0.34}$

Use IS: 919 for convenience.

Neglecting the gauge tolerance and wear allowance, Draw the GO and NO GO limit gauges for checking this Assembly. Comment on these gauges with reference to Taylors Principle.

(b) Name the transducer used for measurement of linear displacement. Explain any one of them with its advantage and limitations. 08

Q.5. (a) Explain what do you understand by (i) an end standard, and (ii) a line standard. State difference between them. Sketch and describe the imperial standard yard. What are the purposes of (a)Parliamentary copies of the standard yard, (b) Secondary or working standard? 10

(b) List the causes for errors in manufactured gears. Describe Parkinson gear tester and state its limitations. 10

Q.6. (a) Calculate the Chordal thickness of a gear tooth of a gear with 40 numbers of teeth and module 3 mm and pressure angle of 20^0. What is the measure of constant chord? Explain with neat sketch. 10

(b) Write the short notes on : 10

i) Tool maker's microscope.

ii) Taylor Hobson Talysurf.

iii) Strain Gauges.