

PDFZilla – Unregistered

Total No. of printed pages = 5

ME 131602

Roll No. of candidate

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2017

PDFZilla - Unregistered
B. Tech. 6th Semester End-Term Examination

METROLOGY AND INSTRUMENTATION

Full Marks – 100 Pass Marks – 35 Time – Three hours

The figures in the margin indicate full marks
for the questions.

1. Explain the following terms : 6×2=12
- (a) Allowance
 - (b) Calibration
 - (c) Fits
 - (d) Primary texture
 - (e) Maximum material limit
 - (f) Threshold

[Turn over

2. Answer the following (any six) : $6 \times 3 = 18$

- (a) What do you mean by repeatability and reproducibility ?
- (b) Why a hole basis system is preferred more than a shaft basis system ?
- (c) Differentiate between absolute error and relative error.
- (d) What do you mean by active and passive transducer ?
- (e) Explain direct and indirect method of measurement.
- (f) Differentiate between primary texture and secondary texture.
- (g) Explain unilateral and bilateral system of writing tolerance with suitable example.

3. Answer the following (any eight) : $8 \times 5 = 40$

- (a) Differentiate between hole basis system and shaft basis system.
- (b) What is least count of vernier instrument ? How is it determined ?

(c) In a hole and shaft assembly of 30 mm nominal size, the tolerance for hole and shaft are :

$$\text{Hole : } 30^{+0.02}_{-0.00} \text{ mm} \quad \text{Shaft : } 30^{-0.04}_{-0.07} \text{ mm}$$

Determine :

- (i) Allowance
- (ii) Hole and shaft tolerance
- (iii) Maximum and minimum clearance obtainable
- (iv) Maximum material limit for hole and shaft
- (v) Type of fit.
- (d) When does parallax error occur ? Explain parallax error with a suitable sketch.
- (e) Discuss any two methods of surface finish evaluation.
- (f) Describe the bourdon tube pressure gauge.
- (g) State and explain Taylor's principle of limit gauge design.
- (h) State the reasons for controlling the surface finish.

(i) What is a sine bar ? How it is used for angle measurement ?

(j) Explain the principle and use of a spirit level.

(k) In the measurement of surface roughness, heights of 20 successive peaks and valleys measured from a datum were 45, 25, 40, 25, 35, 16, 40, 22, 25, 34, 25, 40, 20, 36, 20, 25, 30 and 38 microns. If these measurements were made over a length of 20 mm, determine the C.L.A and RMS values of the surface roughness.

4. Answer the following (any three) : $3 \times 10 = 30$

(a) Design a general type of GO and NO-GO gauge for components having 25 H7f8 fit.

Given :

(i) $i(\text{micron}) = 0.45\sqrt[3]{D} + 0.001D$

(ii) Fundamental deviation of 'f' shaft = $-5.5D^{0.412}$

(iii) 25 mm falls in the diameter step of 18 mm to 30 mm.

(iv) $IT7 = 16i$

(v) $IT8 = 25i$

(vi) Wear allowance 10% of gauge tolerance.

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(b) State the principle of vernier instrument. Explain briefly the construction and use of vernier caliper with a neat sketch.

$2+6+2=10$

(c) What are the functional elements of a measurement system ? Describe them briefly.

$2+8=10$

(d) Describe the construction and working of Taylor Hobson Talysurf surface roughness instrument.

$5+5=10$

(e) What are the various methods of measurement ? Explain any four of them in detail.

$2+8=10$