

Total No. of Questions :6]

SEAT No. :

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P46

Oct./TE/ Insem. - 160

T.E. (Mechanical Engineering)

METROLOGY & QUALITY CONTROL

(2015 Pattern) (Semester - I) (302045)

Time : 1 Hour]

[Max. Marks :30

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.
- 2) Draw neat diagrams wherever necessary.
- 3) Assume suitable data, if necessary.

Q1) a) What is 'Metrology'? Mention the types of metrology & explain it's importance in the industry. [5]

b) Determine the tolerance on hole & shaft for a precision running fit designated by 40H7/g6 [5]

Given:

i) 40 mm lies in dia. Steps of 30 & 50 mm

ii) $i = 0.45 (D)^{\frac{1}{3}} + 0.001D$ microns.

iii) Fundamental Deviation of gshaft = $-2.5 D^{0.34}$

iv) IT 7 = $16 i$

v) IT 6 = $10 i$

Also state the actual Maxi & Min. Sizes of hole & shaft, and Maximum & Minimum clearances.

OR

Q2) a) Define "Standards of Measurements". Differentiate between "Line Standard" & "End Standard" [5]

P.T.O.

- b) Design a workshop type GO - NO GO gauge for a hole of diameter 20 H7 tolerance. [5]

Given:

- i) 20 mm lies in dia. Steps of 18 & 24 mm
- ii) $i = 0.45 (\Phi)^{1/3} \pm 0.001D$ microns.
- iii) $IT 7 = 16 i$
- iv) Wear allowance = 10% of gauge tolerance.

Draw the sketch of tolerance zone of hole, & indicate on it the tolerance zones of GO - NO GO gauges

- Q3) a)** What is a “Comparator”? Explain with a good sketch, how a dial gauge can be used as a “Mechanical Comparator”. [5]

- b) M20×2.5 plug screw gauge was checked for effective dia. Using Floating carriage micrometer & readings taken were as below- [5]

- i) Diameter of standard cylinder = 18.001 mm
- ii) Micrometer readings over standard cylinder with two wires of same dia. = 15.6420 mm
- iii) Micrometer readings over the plug screw gauge with the wires of same dia. = 15.2616 mm
- iv) Best size wires were used for measurement. Calculate effective diameter of screw gauge.

OR

- Q4) a)** Draw a sketch indicating primary & Secondary texture of a surface. How quantification of surface finish is made by CLA & RMS method? Explain with the help of diagram. [5]

- b) What is meant by “Constant chord”? Calculate the “Constant Chord Length” & it’s distance below the tooth tip for a gear of module 5 mm & pressure angle 20°. [5]

- Q5) a)** Explain with a neat labelled sketch & block diagram, the construction & working of a “bridge type” computer controlled CMM. Also state the different types of probes used [5]

- b) What is “Interferometry”? Explain with a neat ray diagram. The functioning of NPL Interferometer. Draw fringe patterns of any three types of surfaces as seen through NPL Interferometer. [5]

OR

- Q6)** a) What is “LASER”? Which properties of “LASER” make it convenient to use in metrology. Explain the functioning of “LASER” Interferometer” with a labelled sketch. [5]
- b) What is a “Machine Vision System”? Explain with a neat labelled sketch, how machine vision system can be used for ensuring that no empty or half filled bottles will leave the packaging line. [5]

