

15N807

Roll No. \_\_\_\_\_

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**15N807**

**M. Tech. I Sem. (New Scheme) Main Exam., Dec. - 2019**

**Production Engineering**

**1MEMPE2-08 Industrial Metrology**

**Time: 3 Hours**

**Maximum Marks: 80**

**Minimum Marks: 26**

**Instructions to Candidates:**

*Attempt any five questions out of eight questions (16 marks each) of the Analytical/Problem Solving/Design/Descriptive Types. Marks of questions are indicated against each question. Draw neat and comprehensive sketches wherever necessary to clearly illustrate your answer. Assume missing data suitable if any and specify the same.*

*Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)*

1. NIL

2. NIL

Q.1 (a) What is the difference between unilateral and bilateral tolerances? Why is unilateral tolerance preferred over bilateral tolerance? [8]

(b) Explain clearly what is meant by selective assembly, when is it used, and how does it differ from interchangeable assembly? [8]

Q.2 Determine the actual dimensions to be provided for a shaft and hole of 90 mm size for H<sub>8</sub>e<sub>9</sub> type clearance fit. Size 90 mm falls in diameter steps of 80 and 100.

Value of standard tolerance unit  $i = 0.45(\sqrt[3]{D}) + 0.001 D$  Value of tolerance for IT8 and IT9 grades are 25*i* and 40*i*. Value of fundamental deviation for 'e' type shaft is  $-11D^{0.41}$ .

Also design the GO and NO GO gauges. Take gauge allowance as 10% of tolerance of part and wear allowance as 10% of gauge tolerance. [16]

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[110]

- ~~Q.3~~ (a) What is a comparator? Classify the different types of comparators. [8]
- (b) Explain the principle and operation of Optical Comparators. [8]
- ~~Q.4~~ (a) State the essential requirements for accuracy in the construction of a sine bar. Why is it that the use of a sine bar is not recommended for angles larger than  $45^\circ$  with the reference plane. [8]
- (b) Explain the principle of Autocollimator with neat sketch. [8]
- ~~Q.5~~ (a) What are the two corrections applied in the measurement of effective diameter by the method of wires. Explain in detail. [8]
- (b) What is the "Best Size Wire"? Derive an expression for the best size wire. [8]
- Q.6 (a) Explain the various methods used for checking the squareness and parallelism part. [8]
- (b) Describe a method to find out the flatness of a surface plate. [8]
- Q.7 (a) Discuss what you understand by the following terms in connection with surface finish measurement: [8]
- (i) Lay
  - (ii) Envelope method
  - (iii) Waviness
  - (iv) Crest line method
- (b) Describe various methods used for measuring surface roughness. [8]
- ~~Q.8~~ (a) What is co-ordinate measuring machine (CMM)? Describe various types of CMM with applications. [8]
- (b) Explain the principle of an interferometer. How is it used in the absolute measurement of slip gauge dimensions? [8]
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