BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE **SEMESTER: IV**
BRANCH: PRODUCTION **SESSION : SP/2018**

SUBJECT: PE4003 METROLOGY

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) What are the objectives of legal metrology and scientific metrology? [2]
(b) Mention the factors which affect the components of a measuring system. [3]

Q2 (a) Differentiate between precision and accuracy in the context of measurement. [2]
(b) State the significance of calibration. [3]
Three 100 mm end bars are measured on a level comparator by first wringing them together and comparing with a 300 mm bar and then inter-comparing them. The 300 mm bar has a known error of +42 μm and the three bars together measure 64 μm less than the 300 mm bar. Bar A is 18 μm longer than bar B and 23 μm longer than bar C. Find the actual length of each bar.

Q3 (a) Why comparators are used in industrial practice? Can limit gauge be considered as a comparator? [2]
(b) State the salient features of a comparator. [3]

Q4 (a) Explain the basic principle of an electro-mechanical system. [2]
(b) Discuss various means of magnification adopted in mechanical comparators. [3]

Q5 (a) What is meant by nominal size and tolerance? [2]
(b) Explain maximum material condition and least material condition in limit and fit system with example. [3]

Q6 (a) State Taylor's principle for the design of limit gauge. [2]
(b) Differentiate between tolerance and allowance. [3]
Four parts with the following dimensions are to be assembled in random. What should be the tolerance on the assembled length?

$\text{Part 1} = 25.32^{+0.02}_{-0.01}$ mm $\quad \text{Part 2} = 18.91^{+0.03}_{-0.03}$ mm

$\text{Part 3} = 62.17^{+0.05}_{-0.07}$ mm $\quad \text{Part 4} = 46.25^{+0.04}_{-0.04}$ mm

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