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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fourth Semester, B.E. - Automobile Engineering

Semester End Examination; June/July - 2015

Measurement and Metrology

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.

ii) Assume suitable missing data if any.

iii) With neat sketches using pencil only

UNIT - I

1. a. Define measurement. Explain the requirements and significance of measurement systems. 6
- b. Illustrate with a block diagram, the generalized measurement system. 6
- c. Define the following terms: 8
 - i) Accuracy
 - ii) Precision
 - iii) Calibration
 - iv) Hysteresis
2. a. Define metrology and state its objectives. 6
- b. Explain how end standards are derived from line standards. 8
- c. Compute the slip gauges to build the following dimensions using M112 Set 6
 - i) 49.3115
 - ii) 68.208
 - iii) 52.496

UNIT - II

3. a. What is a comparator? What are the characteristics of comparator? 6
- b. Explain how magnification is achieved in dial indicator (explain the mechanism)? 6
- c. Sketch and explain the working of Johansson's Mikrokator. 8
4. a. What is the maximum angle to which the SINE BAR can be set (or used)? Justify your answer. 4
- b. Write a note on: 8
 - i) Sine centre
 - ii) Sine bar.
- c. With a neat sketch explain construction and working of LVDT. 8

UNIT - III

5. a. List out the advantages of electrical transducer over mechanical. 4
- b. Explain briefly the various types of mechanical transducer elements. 8
- c. Explain in detail mechanical intermediate modifying systems. 8
6. a. Illustrate the principle of interferometry with neat sketches. 6
- b. Explain the principle of operation of optical flats. 6
- c. With a neat sketch explain the working principle of an autocollimator. 8

UNIT - IV

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| 7 a. | Explain with a sketch, the analytical balance (equal arm balance). | 8 |
| b. | With a neat sketch, explain the working of hydraulic dynamometer. | 8 |
| c. | Explain the working of proving ring with a neat sketch. | 4 |
| 8 a. | With a neat sketch, explain cathode, ray oscilloscope. | 8 |
| b. | What are X-Y plotters? With a block diagram explain its working. | 6 |
| c. | Explain with examples the way terminating devices provide information. | 6 |

UNIT - V

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| 9 a. | How do you calibrate the given strain gauge? | 8 |
| b. | With a neat sketch explain working of mcLeod gauge to measure pressure. | 8 |
| c. | Discuss in detail gauge factor. | 4 |
| 10 a. | What is a thermocouple? State and explain the laws of thermocouple. | 6 |
| b. | Explain the working of an optical pyrometer with a neat sketch. | 8 |
| c. | Explain with a neat sketch pirani thermal conductivity gauge. | 6 |

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