



Printed Pages : 3

TME - 404

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4082

Roll No.

### B. Tech.

(SEM. IV) EXAMINATION, 2008-09

MEASUREMENT, METROLOGY & CONTROL

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions. Each question carries equal marks.

- 1 Attempt any **two** parts of the following : 10
- (a) What is measurement ? Why make measurements?  
Explain the operational description of a measurement system giving generalised input - output configuration.
- (b) Define the following static calibration characteristics:
- (i) Linearity  
(ii) Static sensitivity  
(iii) Repeatability  
(iv) Hysteresis-threshold  
(v) Readability and span.
- (c) Define the word 'Transducer' . What do you understand by active and passive transducers? Give examples and explain their relative merits and demerits.
- 2 Attempt any **two** parts of the following. 10
- (a) Explain the working of a stroboscope with the help of neat diagram.

4082]



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- (b) Explain the temperature compensation and cancellation techniques in resistive type strain gauges. 10
- (c) Explain in brief the working of bimetallic thermometer and pyrometer with the help of line diagrams.

3 Answer any **four** parts of the following:

- (a) Distinguish between line measurement and end measurement. 5
- (b) Explain the following standardization techniques: 5
- (i) Quality specification for measuring tools and equipment, and
- (ii) Environmental standard in measurement.
- (c) Explain why the sine bar is not preferred for greater angles than 45°. How will you use it for angles greater than 45°? 5
- (d) Discuss in brief working of the Johanson & Son's Micrometer. 5
- (e) Give the classification of 'Plain Gauges' and explain the working of any one of them. 5
- (f) Explain in brief the Taylor's principle of a gauge design. 5

4 Attempt any **four** parts of the following:

- (a) Write the names of various methods available for straightness and describe one of them in brief. 5
- (b) In what type of work, the flatness is checked by liquid method? Explain the underlying principle. 5
- (c) Explain the basic difference between flatness interferometer and length interferometer. 5

- (d) Name the three most important dimensions of vee thread which control the fitting of threads. Show in a sketch all the dimensions which are necessary to completely define thread.
- (e) Name and define the various elements of a spur gear which are checked for the correct functioning of a gear.
- (f) Define the term 'primary texture' and 'secondary texture'. What is the dividing wavelength between the two?

5 Attempt any **two** parts of the following :

- (a) List the major advantages and disadvantages of open loop control system. 10
- (b) (i) Find the poles of the following  $F(s)$  2×5

$$F(s) = \frac{1}{1 - e^{-s}}$$

- (ii) Find the Laplace transform of  $f(t)$  defined by
- $$f(t) = 0 \text{ for } t < 0$$
- $$= t e^{-3t} \text{ for } t \geq 0$$
- (c) List the major applications of Pneumatic controllers and compare between pneumatic system and hydraulic system. 10

