

**BACHELOR OF TECHNOLOGY IN  
MECHANICAL ENGINEERING  
(COMPUTER INTEGRATED  
MANUFACTURING)**

**Term-End Examination**

**June, 2008**

**BME-014 : METROLOGY AND  
INSTRUMENTATION**

*Time : 3 hours*

*Maximum Marks : 70*

**Note :** *Attempt any seven questions.*

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1. (a) Discuss briefly the need for precision measurement in an engineering industry. 5
- (b) Establish a relationship between Kelvin and degree Rankine. 5
2. (a) Three elements have following ratings :  
 $R_1 = 80 \pm 5\%$ ,  $R_2 = 70 \pm 5\%$ ,  $R_3 = 60 \pm 5\%$ ,  
where  $R_s = R_1 + R_2 + R_3$ . Find the magnitude of  $R_s$  and the limiting errors in  $R_s$  and in percentage of three elements. 5

- (b) The following data points are expected to follow a functional relation in the form of  $y = ax + b$ . Find a best functional relation between  $x$  and  $y$  using the method of least squares. 5

$x_p$	1.2	1.4	2.3	3.5	4.7
$y_p$	1.4	2.2	3.4	4.6	5.2

3. (a) A 70 mm diameter shaft is made to rotate in a bush. The tolerances for both shafts and bush are 0.040 mm. Determine the dimensions of the shaft and bush to give a maximum clearance of 0.065 mm with the hole basis system. 5

- (b) What are geometrical tolerances ? How are they specified ? Give examples. 5

4. (a) What are the gauges commonly used in production work ? Explain any two of them in brief. 5

- (b) What is the difference between standard gauges and limit gauges ? 5

5. (a) Explain the measuring procedure of the Vernier caliper. 5

- (b) A vernier scale consists of 25 divisions on 12 mm spacing and the main scale has 24 divisions on 12 mm. What is the least count ? 5

6. (a) Name the parts of a universal bevel protractor and state the functions of each of them. 5
- (b) What are the various advantages of electrical comparators over mechanical comparators ? 5
7. (a) Describe the various applications of a projector. 5
- (b) Enlist the various advantages of projector. 5
8. (a) Describe the working principle of a toolmaker's microscope. 5
- (b) Discuss the application of a toolmaker's microscope. 5
9. (a) How is the CMM used in CAM ? Explain with a neat diagram. 5
- (b) What are the advantages of CMM ? 5
10. (a) Why cannot ordinary light be used as a source of light in interferometry ? Explain. 5
- (b) What are the various light sources commonly used in interferometry ? 5

