## **Question Paper**

Exam Date & Time: 08-Jun-2019 (09:30 AM - 12:30 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

## INTERNATIONAL CENTRE FOR APPLIED SCIECES IV SEMESTER B.Sc. (APPLIED SCIENCES) IN ENGINEERING END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019

## **METROLOGY AND MEASUREMENTS [IME 244]**

Marks: 100

Duration: 180 mins.

Answer ANY FIVE FULL questions. Use of Tolerance Table is permitted Missing data may be suitably assumed.			
1)	A)	Define the terms 1. Sensitivity 2. Linearity 3. Threshold. 4. Tolerence.	(8)
	В)	Differentiate between Accuracy and Precision.	(6)
	C)	What do you mean by hole based system and shaft based systems of Fit? why Hole based system is widely recommended in Engineering application?	(6)
2)	A)	With block diagram Explain Elements of generalized measurement system .Explain the functions of each elements.	(8)
	B)	Explain different types o Errors in measurement with example.	(6)
	C)	Calculate the Limits for the Fit $60H_8f_7$ . The fundamental deviation of shaft is - 5.5D <sup>0.41</sup> . State the types of fit and sketch the fit.	(6)
3)		Explain with neat sketch the Bourdon pressure gauge	(8)
	A) B)	A pressure of 256KPa acting on flat diaphragm produce a displacement of 0.2mm at center. What pressure will produce same displacement if diameter of diaphragm is made twice and thickness is made half. Material used is same.	(6)
	C)	Explain with sketch RMS value and CLA value of surface.	(6)
4)	A)	State and Explain Laws of Thermocouple. What are the applications of these laws in Temperature measurement.	(8)
	B)	Explain clearance fit, Transition fit and Interference fit with neat sketch.	(6)
	C)		(6)

From the Standard set of slip gauge select the minimum number of slip gauges for a dimension of 52.785mm with two protector gauges of 2.5mm and sketch the arrangement.

- <sup>5)</sup> Derive an expression for a gauge factor of stain gauge.In the Elastic region <sup>(8)</sup> show that the gauge factor is 2.
  - B) Explain with neat sketch optical pyrometer.
  - C) A metallic stain gauge has resistance of 2000hm and gauge factor 2.It is (6) installed on an aluminum structure which has stress of 0.2GN/m2 and young's modulus 68.7GN/m2.Determine change in resistance of strain gauge that would be caused by loading the material to yield point.
- <sup>6)</sup> Explain the method of testing Squareness by Engineers square. <sup>(6)</sup>
  - A)
  - B) Determine the Ra value of surface if Area above center line is 480mn<sup>2</sup> and <sup>(8)</sup> area below centerline is 480mm<sup>2</sup>, Herizontal magnification is 100 Vertical magnification is 15000, sampling length is 0.8mm. What will be the approximate RMS value. What is the symbol for representing this Ra value in engineering application.
  - <sup>C)</sup> What are the Errors in screw threads.
- <sup>7)</sup> Explain with neat sketch Taylor-Hobson tally surf for Roughness testing. <sup>(8)</sup>

A)

- <sup>B)</sup> Differentiate between driving dynamometer, Absorption Dynamometer and <sup>(6)</sup> Transmission dynamometer? Explain with sketch th Prony brake.
- C) A copper Resistance thermometer has resistance of 100ohms.A copper (6) resistor at 20°C is to be used to indicate temperature of bearing of a machine. What resistance should not be exceeded if maximum bearing temperature not exceed 150°C.Temperature coefficient of copper is 0.00393/°C at 20°C.
- <sup>8)</sup> What is Electric dynamometer? Explain with sketch Cradled DC (10) dynamometer.
  A)
  - <sup>B)</sup> Explain with neat sketch Hydraulic and Pneumatic load cells. <sup>(10)</sup>

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(6)

(6)