



Scheme of Valuation/Answer Key			
(Scheme of evaluation (marks in brackets) and answers of problems/key)			
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY			
SIXTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019			
Course Code: ME312			
Course Name: METROLOGY AND INSTRUMENTATION			
Max. Marks: 100			Duration: 3 Hours
PART A			
<i>Answer any three full questions, each carries 10 marks.</i>			Marks
1	a)	List out the various elements of measurement. Answer: 3 elements- 3 marks.	(3)
	b)	What is ABBE's Principle? Answer: Principle - 3 marks.	(3)
	c)	Distinguish between accuracy and precision of an instrument? Answer: Definition of accuracy- 2 marks, Definition of precision- 2 marks	(4)
2	a)	Explain line standard and end standard measurement Answer: line standard- 2marks, end standard - 2marks	(4)
	b)	Distinguish between limits and tolerance. Answer: Limits 1 mark- tolerance- 2 marks.	(3)
	c)	What is Taylor's principle of gauging? Answer: Principle- 3 marks.	(3)
3	a)	Explain any two type of Limit plug gauges Answer: Explanation - 2marks, Diagram -2 marks	(4)
	b)	Explain with neat sketch the working of Sigma comparator Answer: Diagram - 2mark, Explanation -2mark.	(4)
	c)	List the advantages of pneumatic comparator? Answer: Two advantages - 2 mark.	(2)
4	a)	Explain the working of a NPL flatness interferometer. Answer: Diagram 2 mark- Explanation- 2 marks.	(4)
	b)	Distinguish between hole basis system and shaft basis system Answer: Explanation 2 mark.	(2)
	c)	With neat sketches explain the difference between clearance fit and interference fit? Answer : Explanation - 2 mark, Sketch-2 mark	(4)
PART B			
<i>Answer any three full questions, each carries 10 marks.</i>			
5	a)	Describe any three terms associated with a screw thread. Answer: Each term- 1 mark -each.	(3)
	b)	Differentiate between surface roughness and waviness? Answer: Surface roughness-1 mark- waviness- 2 marks.	(3)



	c)	List out the various methods to measure surface roughness. Answer: Minimum 4 methods- each method- 1 mark.	(4)
6	a)	What is meant by sampling length? Answer: Definition - 2 marks.	(2)
	b)	What is a CMM probe? Explain the various types of probes used in CMM Answer: CMM probe- 1 mark- contact probe -2 mark, non contact probe - 2mark	(5)
	c)	List out the application of Machine vision system? Answer: Applications- 3mark.	(3)
7	a)	Differentiate between the Type A and the Type B optical flats. Answer: Type-A - 1 marks-Type-B - 1 mark.	(2)
	b)	Machine vision system. Sketch-2, Explanation-2	(4)
	c)	Answer- Bridge type CMM - Sketch-1mark, explanation-1mark, Cantilever type CMM- Sketch-1mark, explanation-1mark	(4)
8	a)	Explain three wire method of the screw thread measurement? Answer: Explanation-3 mark ,sketch-1 mark	(4)
	b)	Explain the measurement of the flank angle using the profile projector or microscope Answer: explanation-3 mark	(3)
	c)	Explain the working of the Tomlinson surface meter. Answer: Diagram 1 mark- Explanation- 2 marks.	(3)
PART C			
<i>Answer any four full questions, each carries 10 marks.</i>			
9	a)	Give any four classifications of the measuring instruments. Answer: Each classification- 1 mark.	(4)
	b)	Explain the static characteristics of measuring instruments. Answer: Eight different characteristics - each 0.5 mark.	(4)
	c)	Differentiate between the active and passive transducers. Answer: Active transducers- 1 mark- Passive transducers- 1 mark.	(2)
10	a)	With suitable examples explain the fidelity and the measuring lag. Answer: Fidelity 1 mark- Measuring lag- 2 marks.	(3)
	b)	How will you assess the sensitivity of an instrument? Answer: Assessment procedure- 3 marks.	(3)
	c)	What is the combined sine and cosine error in measurement? Answer: Diagram 2 marks- Derivation- 2 marks.	(4)
11	a)	List out any four classifications of a transducer.	(4)



		Answer: Each classification - 1 mark each.	
	b)	Explain the working of hydraulic load cell Answer: Diagram - 1 mark. Explanation - 2 mark	(3)
	c)	List the advantages and limitation of LVDT Answer: advantages - 1.5marks - limitation - 1.5 mark.	(3)
12	a)	Explain the method of measuring strain by using strain gauges. Answer -Explanation -2 mark , Diagram -1 mark	(3)
	b)	Explain the three component force measurement using piezoelectric quartz crystal. Answer: Diagram 2 marks- Explanation- 2 marks.	(4)
	c)	Explain the method of measuring torque by using a mechanical dynamo meter. Answer: Diagram 1 mark- Explanation- 2 marks.	(3)
13	a)	Explain the basic principle and operation of a vibro-meter. Answer : Diagram 2 marks- Explanation- 2 marks.	(4)
	b)	What is a pressure thermometer? Answer: Diagram 1 mark- Explanation- 2 marks.	(3)
	c)	Explain the working of liquid in glass thermometer. Answer: Diagram 1 mark- Explanation- 2 marks.	(3)
14	a)	Explain the measurement of Thermocouple EMF. Answer: Diagram 1 mark- Explanation- 2 marks.	(3)
	b)	List out any four thermocouple materials. Answer: Each material - 1 mark.	(4)
	c)	What is a resistance temperature detector (RTD)? Answer: Diagram 1 mark- Explanation- 2 marks.	(3)
