Reg No.:_____ Name:_____

03000ME312052005

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S,FE) / S4 (PT) (S) Examination May 2022 (2015 Scheme)

Course Code: ME312

Course Name: METROLOGY AND INSTRUMENTATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1	a)	What is metrology? State its objectives.	(4)
	b)	Explain the various systematic and random errors in measurement?	(6)
2	a)	What are the advantages of wavelength standard over line and end standard?	(5)
	b)	What is a comparator? How does it differ from a measuring device?	(5)
3	a)	Distinguish between tolerance and allowance.	(5)
	b)	Explain the principles of interchangeability and selective assembly.	(5)
4	a)	What are limit gauges? How they are classified?	(5)
	b)	State minimum and maximum material condition with respect to design of limit gauges for measuring external and internal features.	(5)

PART B

Answer any three full questions, each carries 10 marks.

5	a)	Define effective diameter of a screw thread. Explain how the 2-wire method could be used for measuring the effective diameter of a screw.	(6)
	b)	Discuss the various merits and demerits of roughness parameters RMS, CLA, R_z.	(4)
6	a)	What is meant by pitch of a thread? Discuss a method for measuring the pitch of an external thread.	(5)
	b)	Explain Tomlinson surface meter.	(5)
7	a)	What is meant by alignment test on machine tools? Why they are necessary? Explain.	(5)
	b)	How are CMMs classified with respect to constructional features? State their main applications.	(5)

8	a)	Explain machine vision system and its types.	(6)
	b)	What are the applications of machine vision system in metrology?	(4)

PART C

Answer any four full questions, each carries 10 marks.

9	a)	With the help of a block diagram, explain the three stages of a generalized measurement system.	(6)
	b)	Define the following: i) accuracy, ii) precision, iii) sensitivity, and iv) speed of response. Give examples for each.	(4)
10	a)	Define 'Transfer Efficiency'. List the advantages of electrical transducers over mechanical transducers.	(5)
	b)	Distinguish between the following: (a) Active and passive transducers (b) Transducers and inverse transducers	(5)
11	a)	Briefly explain with a neat sketch the principle and working of a LVDT.	(6)
	b)	List the quality attributes of transducers.	(4)
12	a)	With a neat sketch, explain how strain in a machine element subjected to tensile load can be measured using electrical resistance strain gauges. Use a compensation gauge also.	(5)
	b)	With the help of a neat sketch, explain the working of an analytical balance.	(5)
13	a)	Explain in detail the working principle of hydraulic dynamometers which is used for torque measurement.	(5)
	b)	Explain the method of force measurement using a strain gauge load cell.	(5)
14	a)	What is a thermo couple? With a schematic diagram, explain how a thermo couple can be used to measure the metal cutting temperature on a lathe.	(5)
	b)	With a neat sketch, explain resistance thermometer.	(5)

****