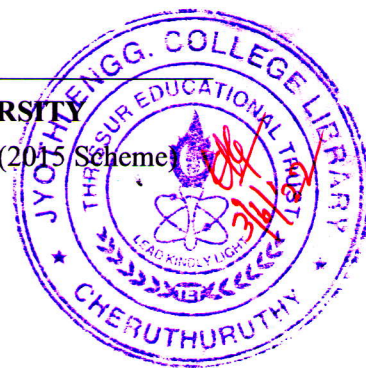


Reg No.: \_\_\_\_\_

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, Rz. (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: (5)  
(a) Active and passive transducers  
(b) Transducers and inverse transducers
- 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)

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