Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech (Hons.) Degree Examination December 2024 (2021 Admission)

Course Code: MET499

Course Name: PRECISION MACHINING

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		What is Abbe's principle? Why is it important in metrology?	(3)
2		Define the term *resolution* in the context of measurement systems.	(3)
3		What are the main causes of *thermal errors* in machine tools?	(3)
4		How do vibrations influence the accuracy of machined components?	(3)
5		What are acoustic emission (AE)-based monitoring systems?	(3)
6		Differentiate between contact and non-contact sensors.	(3)
7		Define process planning in the context of precision machining.	(3)
8		Why is process capability considered a planning metric in precision machining?	(3)
9		What materials are typically machined using diamond turning?	(3)
10		Differentiate between fixed abrasive process and loose abrasive process.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Describe the key competitive drivers for the growth of precision machining.	(6)
	b)	Explain any two measurement techniques of flatness in precision machining.	(8)

OR

12	a)	Explain the terms accuracy and precision. Explain their differences with suitable examples.	(6)
	b)	What is surface roughness, and why is it a critical parameter in precision machining? Explain the various techniques used to measure surface roughness.	(8)

Module II

13	a)	Illustrate the components of an error budget flowchart and explain how it aids in precision system design.	(7)

b) With a sketch explain the principle of operation of aerostatic bearing. (7)

OR

14 a) Explain the various sources of mechanical errors in precision machining and their effect on machining accuracy. (14)

Module III

15 a) Describe the process of AE-based monitoring of grinding wheel dressing. (7)

b) Explain the principle of AE-based monitoring in face milling. (7)

OR

16 a) Explain the basic types of sensors used in manufacturing. (14)

Module IV

17 a) Define process capability (C_p) and capability ratio (C_r). Explain their significance in precision manufacturing. (14)

OR

18 a) Explain the concept of integration levels in process planning for precision manufacturing and describe how they influence manufacturability. (14)

Module V

19 a) What are the distinct features of machine tools used for diamond machining. (7)

b) With a neat sketch explain typical single point diamond tool geometry. (7)

OR

20 a) Explain chemical mechanical planarization process with suitable schematic. (14)

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