

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Fifth Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: MET307

Course Name: MACHINE TOOLS AND METROLOGY

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

		Marks
1	Define counter boring and explain briefly counterboring process in the lathe.	3
2	Explain how a keyway cut on pulley bore.	3
3	Differentiate Up milling and down milling.	3
4	Explain any one synthetic abrasive used in making grinding wheel and its significant application.	3
5	Explain the purpose of broaches in machining industry.	3
6	Briefly explain gear generation process.	3
7	Describe Taylor's principle of gauges.	3
8	What is the standard deviation in the limit system?	3
9	Compare electrical and electronic comparators.	3
10	What are the different applications of CMM.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a) Differentiate horizontal and vertical spindle screw machines.	5
	b) Explain any three work holding devices used in Slotter machine	9
12	a) Explain any four processes that can be done on a drilling machine with sketches.	8
	b) Draw a block diagram of boring machine and label all parts.	6

Module -2

13	a) Mark all elements of plain milling cutter with neat figure.	7
	b) Explain the principle of indexing head with a good sketch.	7

- 14 a) Explain the method of specifying a grinding wheel with suitable examples. 6
b) Differentiate between hand lapping and machine lapping. 8

Module -3

- 15 a) Describe how a gear is manufactured by broaching. 6
b) Write the procedure of bevel gear manufacturing by form cutters in a milling machine. 8
- 16 a) What are the gear finishing operations and explain any one of them with sketches. 7
b) Write the procedure of cutting spiral gear teeth with suitable example. 7

Module -4

- 17 a) Differentiate systematic error and random error. 6
b) Explain the classification of tolerances with suitable examples. 8
- 18 a) Explain the applications of slip gauge, ring gauge and snap gauges. 6
b) Define precision, accuracy, sensitivity and interchangeability. 8

Module -5

- 19 a) Explain the terminology of gear with a neat figure. 7
b) Explain the measurement of screw thread elements by three wire method. 7
- 20 a) What is interferometry? Explain optical flat and its uses. 8
b) Explain elements of surface roughness with a figure. 6

Reg No.: _____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Regular and Supplementary Examination December 2022 (2019 Scheme)

Course Code: MET 307**Course Name: MACHINE TOOLS AND METROLOGY**

Max. Marks: 100

Duration: 3 Hours

PART A*(Answer all questions; each question carries 3 marks)*

Marks

- | | | |
|----|--|---|
| 1 | Define the terms speed, feed and depth of cut in a straight turning operation. | 3 |
| 2 | List any six operations that can be performed in a drilling machine. | 3 |
| 3 | How will you calculate the machining time in a milling operation? | 3 |
| 4 | Compare honing and lapping operations. | 3 |
| 5 | Mention any three gear finishing operations. | 3 |
| 6 | What is a form cutter? How is it used in a gear manufacturing process? | 3 |
| 7 | Differentiate between precision and accuracy. | 3 |
| 8 | What is a feeler gauge? What is its practical use? | 3 |
| 9 | Define the term flatness. How is it measured and quantified? | 3 |
| 10 | What is a Coordinate Measuring Machine (CMM)? What is its use? | 3 |

PART B*(Answer one full question from each module, each question carries 14 marks)***Module -1**

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|----|---|---|
| 11 | a) With a neat sketch explain the various parts of an engine lathe. | 7 |
| | b) With neat sketches explain various types of boring tools and reamers. | 7 |
| 12 | a) With the help of neat sketches explain the various operations that can be performed in a lathe and the tools used for these operations. | 7 |
| | b) With a neat sketch explain the hydraulic shaper mechanism. What are the advantages of this mechanism over crank and slotted lever mechanism? | 7 |

Module -2

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|----|---|---|
| 13 | a) With the help of neat sketches explain any five operations that can be performed in a milling machine and the tools used for these operations. | 7 |
| | b) With neat sketches explain the cylindrical grinding and the surface grinding operations. | 7 |

- 14 a) With a neat sketch explain the differential indexing method used in a milling process. 7
b) With the help of a suitable example explain the marking system of a grinding wheel. 7

Module -3

- 15 a) With a neat diagram explain the gear hobbing process 7
b) With the help of neat sketches explain the various parts of a surface broaching machine and a continuous broaching machine. 7
- 16 a) With a neat sketch explain any one bevel gear cutting process. 7
b) Differentiate between the internal and the external broaching processes. 7

Module -4

- 17 a) Explain the terms interchangeability and selective assembly. 7
b) Explain the principle of gauge tolerance. How do we give wear allowance to a snap gauge? 7
- 18 a) The tolerances for a hole and shaft assembly having a nominal size of 50 mm are 6
as follows: Hole = $40^{+0.021}_{+0.000}$ mm and shaft = $40^{-0.040}_{-0.075}$ mm
Determine
(a) Maximum and minimum clearances
(b) Tolerances on shaft and hole
(c) Allowance
(d) Maximum and minimum metal limit of hole and shaft
(e) Type of fit
- b) With the help of neat sketches explain plug, ring, slip and snap gauges. 8

Module -5

- 19 a) Explain the principle, working and parts of an autocollimator with a neat sketch. 7
b) With the help of neat diagrams explain the mechanical, the optical and the pneumatic comparators. 7
- 20 a) What are the various elements of a gear to be measured and how are they measured practically? 7
b) With the help of a neat diagram explain the principle and working of any one instrument used for the surface roughness measurement. 7
