Reg No.:_____ Name:_____

**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**

| | | | |
|---|---|---|---|
| 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**

| | | | |
|---|---|---|---|
| 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 as follows: Hole = $40^{+0.021}_{+0.000}$ mm and shaft = $40^{-0.040}_{-0.075}$ mm 6

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

***