

Reg. No.									
----------	--	--	--	--	--	--	--	--	--



MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, JUNE 2018

SUBJECT: MACHINE TOOL TECHNOLOGY [MTE 4016]

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitably assumed with justification

- 1A.** In the orthogonal turning of a bar of 40 mm diameter with a feed of 0.35 mm/rev, depth of cut of 3 mm, shear angle 20° and cutting velocity of 70 m/min for a given single point cutting tool. If the cutting force is 1200 N. Calculate orthogonal rake angle, The normal force acting at the chip-tool, shear velocity and chip flow velocity. **(6)**
- 1B.** What are the differences between a cutting tool and machine tool in context of their functions? **(4)**
- 2A.** Derive an expression for shear strain of chip in orthogonal cutting. **(6)**
- 2B.** An HSS tool is used for turning operation. The tool life is 1hr. when turning is carried at 30m/min. The tool life will be reduced to 2.0 min if the cutting speed is double. Find the suitable speed in RPM for turning 300 mm diameter so that tool life is 30 min. **(4)**
- 3A.** What is the working principle of tool work thermocouple technique for measuring cutting temperatures? Support your answer with a schematic diagram. **(5)**
- 3B.** Discuss the following cutting tool materials in context of their composition and advantages: (ii) Cemented carbide (iii) Coated carbide tools **(5)**
- 4A.** Explain the following motors in context of their performance, construction, cost and limitations: (i). D. C. Brush Servomotor (ii). D. C. Brushless Servomotor **(5)**

4B. Discuss the importance of a locator? Describe different types of locators? (5)

5A. A lot of 120 pieces have to be machined. The estimated cost components in three different modes are as follows. (5)

Mode	Fixed cost (Rs.)	Machining cost / pc (Rs./piece)
1 W : In ordinary machine without any jig or fixture	200,000.00	5000.00
2 JF : In ordinary machine but with jig or fixture	3,00,000.00	2500.00
3 A : In automatic special purpose machine	6,00,000.00	1000.00

Select the most appropriate mode with justification.

5B. How does incremental rotary encoder and absolute rotary encoder function? (5)
Support your answer with diagram.