Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER MAKEUP EXAMINATIONS, JUNE 2017

SUBJECT: MACHINE TOOL TECHNOLOGY [MTE 4016]

[REVISED CREDIT SYSTEM]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Derive the expressions for force relationships using merchant circle diagram in orthogonal cutting. **(6)**

1B. Derive the velocity relationships in the orthogonal cutting. **(4)**

2A. In the orthogonal turning of a bar of 50 mm diameter with a feed of 0.235 mm/rev, depth of cut of 4 mm, shear angle 20^{o} and cutting velocity of 90 m/min, it is observed that the main cutting force is perpendicular to the friction force acting at the chip-tool interface. The cutting force is 1200 N. Calculate orthogonal rake angle, The normal force acting at the chip-tool, shear velocity and chip flow velocity. **(4)**

2B. A carbide tool is used for turning operation. The tool life is 1hr. when turning is carried at 40m/min. The tool life will be reduced to 4.0 min if the cutting speed is double. Find the suitable speed in RPM for turning 200 mm diameter so that tool life is 30 min. **(4)**

2C. Explain any 2 types of tool wear and their location on the single point cutting tool. **(2)**

3A. Explain the heat distribution regions while turning a rod by a single point cutting tool in detail **(5)**

3B. State general characteristics of HSS, carbide and coated carbide tools. **(3)**

3C. Discuss the advantages and disadvantages of diamond tool? **(2)**

4A. Explain the following motors in context of their performance, construction, cost and limitations: **(6)**

(i). D. C. Brush Servomotor

(i). D. C. Brushless Servomotor

(i). A.C. Servomotor

4B. Explain the major differences between recirculating roller screw and planetary roller screw? **(4)**

5A. Discuss the difference between jig and fixture? Explain any 3 types of clamps used in the drilling operation. **(4)**

5B. Define a qualified tool in CNC? What are its advantages? **(2)**

5C. What are the advantages and disadvantages of following fixtures used in CNC? **(4)**

(i) Dedicated chuck

(ii) Expanding mandrels and collets.