Code: ME5T2

III B.Tech - I Semester – Regular/Supplementary Examinations October 2017

METAL CUTTING AND MACHINE TOOLS
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer **all** the questions.   All questions carry equal marks

11 x 2 = 22 M

1. a) Name the modes of tool failure in machining.
   b) What are the main applications of cutting fluids in machining?
   c) Explain the formation of built-up-edge (BUE) in chip during machining.
   d) Explain the steady rest and follower rest used in engine lathe.
   e) Explain the swiveling compound rest method for taper turning.
   f) What is the significance of quick return motion mechanism in shaper?
   g) List out work holding devices on a slotting machine.
   h) Distinguish between drilling and boring.
   i) Explain Grinding wheel designation with standard marking system.
   j) Distinguish between straddle milling and gang milling.

k) List out various types of milling cutters used in milling.

PART – B

Answer any ***THREE*** questions.   All questions carry equal marks.   3 x 16 = 48 M

2. a) With a neat sketch describe briefly the mechanism of chip formation in ductile materials and explain different types of chips in metal cutting.   6 M

   b) Draw Merchant's circle diagram, derive a relation between the shear angle, rake angle and friction angle (Merchant's Relation) and find out the equation for cutting force in an orthogonal machining operation using that relation.   10 M

3. a) What are the various methods available for taper turning on a centre lathe? Explain in detail with a sketch the method used for machining steep tapers of short length.
                                                                  10 M

   b) What are the principle features of automatic lathes? Classify different types of automatic lathes.   6 M

4. a) Determine the actual machining time that will be required to remove, by shaping, a layer of 2 mm thickness from a cast iron plate of length 100 mm and

width 60 mm at cutting velocity of 40 m/min and feed of 0.2 mm/stroke. Assume approach and overrun along width = 2 mm and along length = 5 mm, quick return ratio of the shaping machine is 2/3.   10 M

b) Compare shaping machine, planning machine and slotting machine with respect to configuration, tool-work motions and applications.   6 M

5. a) Describe grinding-wheel structure with the help of a neat sketch and state different bonding and abrasive materials used in it.   8 M

b) Sketch and explain the various elements of a Reamer.

8 M

6. a) What are the various types of work holding devices used in milling? Explain their relative applications and disadvantages.   8 M

b) How does a universal milling machine differ from a conventional knee and column type machine? Justify.

8 M