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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Fifth Semester, B.E. - Industrial and Production Engineering
Semester End Examination; Dec - 2016/Jan - 2017
Theory of Metal Cutting

Time: 3 hrs *Max. Marks: 100*

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

1 a.	Explain the effects of cutting parameters on tool geometry.	8
b.	With neat sketches, explain the single and multi-point cutting tool.	12
2 a.	With neat sketches, explain the different mechanism of chip formation.	10
b.	What is a chip breaker? Describe its various forms.	10

UNIT - II

3 a. With the help of Merchant's circle diagram obtain the four forces that act upon the chip in the orthogonal metal cutting model that cannot be measured directly in an operation. — 10

b. In a machining operation that approximates orthogonal cutting, the cutting tool has a rake angle = 10º. The chip thickness before the cut is 0.5 mm and the chip-thickness after the cut is 1.125 mm. Calculate the shear plane angle and shear strain in the operation. Also determine the strength of the work material, if the cutting force and thrust force are 1559 N and 1271 N respectively. The width of the orthogonal cutting operation is 30 mm. — 10

4 a.	List the requirements of a good dynamometer.	6
b.	With neat sketches, explain lathe tool and milling tool dynamometers.	14

UNIT - III

5 a.	Enumerate the features affecting tool life. Briefly explain the effect of each factor.	15
b.	What is machinability? Discuss the important machinability criteria.	5
6. a.	Briefly explain the different costs involved for a single pass turning operations.	10
b.	Derive an expression for optimum cutting speed for minimum cost in turning operation.	10

UNIT - IV

7 a.	With a schematic, explain the different sources of heat generation in metal cutting.	8
b.	List the merits and demerits of using cutting fluids.	12
8 a.	Explain briefly the methods of applying the cutting fluids.	6
b.	What are types of cutting fluid?	9
c.	List the basic composition of the cutting fluid.	5

UNIT - V

9 a. List and briefly explain the desirable properties of cutting tool materials.   5

  b. Write a short note on the following cutting tool materials :

  i) HSS – High Speed Steel

  ii) CBN – Cubic Boron Nitride   15

  iii) PCD – Poly – Crystalline Diamond.

10 a. Write short notes on the following :

  i) Cemented carbides for non-steel cutting grades and steel cutting grades   10

  ii) Coated carbides   5

  iii) Ceramics.   5

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