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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; May/ June - 2019

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. With a neat sketch, explain mechanics of metal cutting and mechanics of chip formation process. 12
 b. Explain the effect of cutting parameters on Tool Geometry. 8
 2 a. With a neat sketch, explain Nomenclature of single point cutting tool. 10
 b. Explain ASA and ISO tool Nomenclature system. 10

UNIT - II

- 3 a. With a neat sketch, explain the different forces acting in metal cutting process. 5
 b. Derive an expression for shear plane angle. 7
 c. Derive the expressions for F_f and F_n in orthogonal metal cutting process. 8
 4 a. Explain the reasons for measuring cutting forces. 5
 b. With a neat sketch, explain working of lathe tool, milling dynamometer and drilling dynamometer. 15

UNIT - III

- 5 a. Define Machinability and Machinability Index. 4
 b. What is Tool Life? With a neat sketch, explain how failure of tool takes place? 16
 6 a. Briefly explain the different costs of manufacturing a component. 6
 b. Derive an expression for optimum cutting speed and tool life for;
 i) Minimum production cost ii) Maximum production rate 14

UNIT - IV

- 7 a. Explain the functions and properties of cutting fluid. 10
 b. With a neat sketch, explain Tool-work thermocouple. 10
 8 a. With a neat sketch, explain heat generation in metal cutting process. 6
 b. Briefly explain the factors affecting heat generation in metal cutting process. 6
 c. With a neat sketch, explain application and penetration of cutting fluid. 8

UNIT - V

- 9 a. Mention the requirement of cutting tool materials. 8
 b. Briefly explain High speed steels and cement carbide tools. 12
 10. Write a note on following tool materials
 i) Diamond ii) Sialon 20
 iii) CBN iv) UCON