



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 - 2018

Theory of Metal Cutting

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

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|-----|---|----|
| 1a. | Explain the principle of metal cutting by clearly indicating the chip formation. | 10 |
| | b. Explain the effect of cutting parameters on tool geometry with the help of suitable sketch. | 10 |
| 2a. | What are the different types of chips? Explain with the help of suitable sketches. | 10 |
| | b. Explain the concept of chip thickness ratio, chip breaker with the suitable illustrative sketches. | 10 |

UNIT - II

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|------|---|----|
| 3 a. | Derive an expression for Merchant's circle diagram for the various forces and clearly state the assumptions made. | 10 |
| | b. Sketch and explain Lathe tool dynamometer to measure the forces of metal cutting. | 10 |
| 4 a. | Derive an expression for the determination of shear plane angle with suitable assumptions. | 10 |
| | b. Sketch and explain milling dynamometer to measure the forces in metal cutting. | 10 |

UNIT - III

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| 5 a. | With the help of sketches, explain the different types and forms of wear. | 10 |
| | b. Explain the concept of machinability and discuss the machinability index and its influence in metal cutting practice. | 10 |
| 6 a. | What is tool life? Explain the factors influencing tool life with suitable graphs. | 10 |
| | b. Explain the concept of economics of machining and discuss briefly the cost analysis of machining. | 10 |

UNIT - IV

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| 7 a. | Explain the thermal aspects of metal machining and discuss the ways of reducing it. | 10 |
| | b. Explain the types of cutting fluids and discuss its function in metal cutting. | 10 |
| 8 a. | With suitable graph, explain the effect of cutting fluid on cutting speed and tool life. | 10 |
| | b. Explain the selection and application of cutting fluids in metal cutting. | 10 |

UNIT - V

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|-------|---|----|
| 9 a. | Explain the characteristics and composition of the following tool materials : | 10 |
| | i) HSS ii) Cemented carbides and composition | |
| | b. Explain the characteristics and composition of the following tool materials : | 10 |
| | i) Ceramics ii) CBN | |
| 10 a. | Explain the properties of cutting tool materials with suitable example. | 10 |
| | b. Explain the characteristics of the following tool materials and discuss their applications : | 10 |
| | i) SIALON ii) UCON | |