Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14ME2046** | **Duration :** | **3hrs** |
| **Sub. Name :** | **METAL CUTTING THEORY AND PRACTICE** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q.**  **No.** | **Sub**  **Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | List the various metal removal processes. | CO1 | 2 |
| b. | What are the four important characteristics of materials used for cutting tools? | CO1 | 4 |
| c. | What is chip? Explain different types of chips produced during formation. | CO1 | 14 |
| **(OR)** | | | | |
| 2. |  | Explain various cutting tool materials. | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | Explain mechanism of metal cutting with suitable examples and sketches. | CO2 | 20 |
| **(OR)** | | | | |
| 4. |  | In an orthogonal cutting operation on a work piece of width 2.5mm, the uncut chip thickness was 0.25mm and the tool rake angle was zero degree. It was observed that the chip thickness was 1.25mm.The cutting force was measured to be 900N and the thrust force was found to be 810 N.  (a) Find the shear angle.  (b) If the coefficient of friction between the chip and the tool, was 0.5.  What is the machining constant Cm? | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | Explain cutting fluid purposes, method of application and their types. | CO3 | 20 |
| **(OR)** | | | | |
| 6. | a. | Show the components of cutting forces in Orthogonal cutting with neat sketch. | CO3 | 12 |
| b. | Determine the temperature rise at the shear plane from the following experimental data in orthogonal cutting of mild steel of density 7.87 gm/cm3 and specific heat of 0.44 J/gm taken that λ = 1.  Force component in the direction of cutting velocity Fh = 1600 N  Force component normal to machine surface Fv = 500 N  Depth of cut = 0.3 mm  Width of cut = 5 mm  Chip thickness ratio = 0.42  Tool rake angel = 10o  Cutting Velocity = 35 m/min |  | 8 |
|  |  |  |  |  |
| 7. | a. | Explain the economics of (i) Facing operations  (ii) Interrupted cutting | CO4 | 7  7 |
| b. | State the components of the costs for single pass turning operations. | CO4 | 6 |
| **(OR)** | | | | |
| 8. | a. | State the parameters that influence the life of tool and discuss. | CO4 | 16 |
| b. | A mild steel bar is turned with HSS too. Determine the tool life for a cutting velocity of 40m/min, if the tool life equation is VT0.2 =80. Also find the cutting speed for 60 min tool life. | CO4 | 4 |
| **Compulsory:** | | | | |
| 9. | a. | Explain the following wear mechanism in tools with neat sketches. (3x5 = 15)  (i) Diffusion wear (ii) Adhesive wear (iii) Fatigue wear mechanism | CO5 | 15 |
|  | b. | State how to avoid chatter on existing machine tools. | CO5 | 5 |