

Department of Mechanical Engineering
Birla Institute of Technology and Science, Pilani, Pilani campus
MF F316: Machining and Machine Tools
Mid Semester Examination (14/10/2023)
Time: 90 min; Max. Marks: 60

Note to Students:

1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
 2. This is a CLOSED BOOK test.
 3. Assumptions made if any, should be stated clearly at the beginning of your answer.
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1. Answer the following.
 - a) Explain the effect of rake angle on cutting force, cutting speed, and cutting temperature with a graphical representation. **15**
 - b) Explain tool designation with respect to the American Standard Association (ASA) system along with the drawing. **15**
2. During an orthogonal machining operation on mild steel, the results obtained are: $t_1 = 0.25$ mm, $t_2 = 0.70$ mm, $w = 2.60$ mm, $\alpha = 0^\circ$, $F_c = 800$ N, $F_T = 400$ N, diameter of workpiece = 50 mm, rotational speed = 1200 rpm. Determine the following: (i) coefficient of friction, (ii) Ultimate shear stress of the workpiece, and (iii) power consumption (*use only Lee and Shaffer shear angle relation to calculate shear angle*). **15**
3. Using the Taylor equation for tool life and letting $n = 0.3$, calculate the percentage increase in tool life if the cutting speed is reduced by (a) 40% and (b) 70%. **15**