Assignment #1 (Module 1, Machining), Please submit by Friday Sep 20th by 6 PM, by Email a copy (scan, or a clear photo) to the TA (Poorya, Email: Pak791360@yahoo.com)

1- In a turning operation on a low Carbon Steel, the cutting speed is $165\ mm/min$, Feed Speed is $0.25\ mm/sec$, depth of cut 5mm. How much power will the lathe draw in performing this operation? The mechanical efficiency of the lathe is 85%. The Specific cutting energy of the workpiece material is $1.6\ W.s/mm^3$

2- In a turning operation, the cutting tool has a rake angle $10°$. The chip thickness before the cut $t_0 = 0.5mm$ and after the cut $t_c = 1.25mm$. The workpiece is an Aluminum alloy shaft with the specific cutting energy $0.7\ N.m/mm^3$. The cutting speed is $120\ m/min$ *(i)* Determine the friction coefficient between the tool and workpiece *(ii)* Estimate the power requirement for machining the workpiece if the average cutting force is measured 1550N during the machining.

3- A CNC lathe is programmed to taper a cylindrical shaft. The machining starts at the maximum depth of cut (end A) and taper down to 0 depth of cut at B. If the axial speed of the tool is V_a and the rotation speed of the shaft is N, find a formula to compute the power change during machining this shaft?