

امتیاز هر سوال ۵ نمره میباشد.

# ۱ - The dynamometer recorded the following: feed force ۲۰۰ kg, cutting force ۳۰۰ kg. The rake angle of the tool used was ۱۰°. The chip thickness ratio is ۰.۳۵. Find

- ۱- Shear angle?
- ۲- Shear force?
- ۳- Co-efficient of friction at the chip-tool interface ( $\mu$ ) and the friction angle?
- ۴- Compressive force at the shear plane?

#۲ - A seamless tube ۳۰ cm outside diameter is reduced in length on a lathe with the help of a single point cutting tool. The cutting speed is ۴۰ m/min, the depth of cut is ۰.۱۲۵ mm. The length of continuous chips, for one revolution of the tube, on measurement comes to be ۱۷.۷۷ cm. The cutting force is ۲۰۰ kg and the feed force is ۷۵ kg. the rake angle of the tool is ۳۰°. Calculate,

- ۱- Co-efficient of friction
- ۲- Chip thickness ratio
- ۳- Shear plane angle
- ۴- Velocity of the chip along the tool face
- ۵- Velocity of shear along the shear plane

#۳ - Show that in metal cutting when the working normal rake is zero, the ratio of shear strength of work material to the specific cutting energy is given by:

$$\frac{\tau_s}{p_s} = \frac{(\lambda - \mu r_c) r_c}{\lambda + r_c^2}$$

#۴ - Derive an expression for the specific cutting energy,  $p_s$ , in terms of the shear angle, and the mean shear strength of the work material  $\tau_s$ , in orthogonal cutting. Assume that the shear-angle relationship of Ernest and Merchant applies.