

Roll No.

--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages: 02
Total No. of Questions: 08

M. Tech (PE) (Sem.-1ST)
METAL CUTTING
Subject Code: PE-502
Paper ID: E0442

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTION TO CANDIDATES:-

- 1. Attempt any five questions out of eight**
- 2. Each question carries TWENTY marks**

- Q1. a) What are the various mechanisms of chip formation during machining of mild steel?
- b) Explain the concept of shearing strain for chip deformation.
- Q2 a) A metal cutting test results indicates that for a given operation the optimum rake should be 10° . For convince of chip flow a $2-3^\circ$ of inclination angle is recommended. What is the back rake and side rake of this tool, if principle cutting edges angle is 60° ?
- b) Explain the effect of cutting variables on chip reduction coefficients.
- Q3. a) A tool shape with 6° back rake and 55° side cutting edge angle has to be used under orthogonal cutting conditions. The cutting forces are $F_z=260$ kg and $F_{xy}=190$ kg. The cutting velocity is 90m/minute Calculate
- cutting is orthogonal
- b) The kinetic coefficient of friction
- c) Energy consumed in friction per unit volume of metal removal if the chip reduction coefficient is 2.75.
- b) Explain the construction and working of four component strain gauge type drill dynamometer.
- Q4. a) Derive an expression for thrust force at the chisel edge zone of a twist drill.
- b) Find the orthogonal cutting components of the machining force during machining of an aluminium alloy with an uncut thickness of 0.15mm, width of cut being 2.5 mm.
- Q5 a) What are the various heating techniques in hot working process? Discuss the advantages and disadvantages over each other.
- b) Explain the term "Form Stability" at low cutting speed

- Q6 a) Explain the mechanism of tool wear during machining process. Compare the wear characteristics of conventional cutting tool materials
- b) What do you mean by the economics of metal cutting? Derive an expression for optimum cutting speed for maximum production rate. Assume suitable assumptions.
- Q7 a) Derive an expression for maximum grit chip thickness during grinding process.
- b) Explain the effect of temperature during grinding process
- Q8 Write short note on the followings:
- a) Diffusive wear model
- b) Lapping and Honing process

-----END-----