

**ANNA UNIVERSITY – 2007**  
**B.E/B.TECH MODEL EXAMINATION**  
**THEORY OF METAL CUTTING**  
**(PRODUCTION ENGINEERING)**

TIME-3HOUR  
MARK-100

ANSWER ALL QUESTIONS

**PART – A (10 X 2 = 20 MARKS)**

1. List out the types of chips?
2. What is the function of chip breakers?
3. What is Built-Up-Edge?
4. Write the expression for shear angle with respect to rake angle and chip thickness coefficient?
5. Sketch the forces during turning.
6. What are the requirements of a dynamometer for measuring forces in cutting?
7. What are the sources of heat generation in machining?
8. State the important functions of cutting fluids.
9. Define machinability.
10. What is crater wear?

**PART – B (5 X 16 = 80 MARKS)**

11. During the machining of mild steel with  $0^\circ - 10^\circ - 8^\circ - 8^\circ - 90^\circ - 2$  mm ORS shaped carbide tool, the following observations were made.

Depth of cut = 2.0 mm; feed = 0.2 mm / rev; cutting speed = 150m / min;  
chip thickness = 0.4 mm; tangential force = 320 N; axial force = 170 N. Calculate

- (i) Shear force and normal force on shear plane
- (ii) Friction force and normal force on rake face
- (iii) Kinetic coefficient of friction and
- (iv) Specific energy in cutting

12. a) (i) Sketch the nomenclature of tool in American System.  
(ii) Sketch the plain milling cutter and label its nomenclature.

( OR )

b) Calculate :

- (i) orthogonal rake,
- (ii) inclination angle and
- (iii) normal rake of a cutting tool having side rake ( $-10^\circ$  ), back rake ( $-5^\circ$ ) and side cutting edge angle of  $30^\circ$  .  
Sketch the above geometries for the tool.

13. a) (i) Define gauge factor and list out various types of strain gauges.

(ii) Explain the strain gauge type dynamometer for turning.

( OR )

b) (i) Discuss the chip production in upmilling and down milling.

(ii) How are three forces measured in milling?

14. a) (i) Discuss the heat generation in turning.

(ii) How the temperature in machining affects the tool life?

( OR )

b) (i) Explain the action of cutting fluids.

(ii) Enumerate the types of cutting fluids and mention the composition and applications any three types.

15. a) (i) Explain the mechanisms of tool wear.

(ii) Discuss the factors which influence machinability.

( OR )

b) (i) Discuss any three important tool materials with respect to composition and applications.

(ii) Derive the Expression for Tool life for maximum production rate.

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