

Seventh Semester B.Tech Degree Examination

(2013 Scheme)

MODEL QUESTION

13.704 THEORY OF METAL CUTTING (P)

Max Marks : 100

Time : 3 hrs

(Answer all questions in part A and any one full question from each module in part B)

PART A

- 1) Sketch a single point cutting tool and name its parts
- 2) Point out the function of a chip breaker? Name the different types?
- 3) What is tool signature?
- 4) Differentiate between orthogonal cutting and oblique cutting
- 5) Explain the term chip thickness ratio
- 6) Explain Lee Shaffer theory
- 7) Point out the functions of cutting fluids?
- 8) What is stellite ? How is it manufactured?
- 9) Name the various mechanisms of tool wear
- 10) What is the principle of strain gauge dynamometer?

(2 x 10 = 20 marks)

PART B

MODULE 1

11. a) What are the different types of chips formed during metal cutting?
Explain
b) Explain the primary and secondary deformations in metal cutting
12. a) What is BUE? How it affects the metal cutting process
b) Explain the effects of tool angles in metal cutting with sketches

MODULE 2

13. a) Sketch Merchant's circle diagram and explain the different quantities involved
b) Mild steel is being machined at a cutting speed of 210 m/min with a tool of rake angle 10° . The width of cut and uncut chip thickness are 3 mm and 0.2 mm respectively. If the value of coefficient of friction between the tool and the chip is 0.5 and shear stress 400 N/mm^2 . Determine:
1) The shear angle
2) Components of machining force
14. a) What are the parameters which affect the forces and the power requirement in metal cutting
b) Following data were observed during orthogonal cutting. Determine friction angle, shear angle and specific cutting power. Cutting force 1114 N; Thrust force 527 N; Cutting ratio 0.4; Rake angle 12° ; Chip thickness 1.35mm; Cutting speed 65 m/min; Width of cut 5 mm.

MODULE 3

- 15 a) What is machinability index? Explain various criteria for machinability assessment
b) How economical machining is carried out? Derive an expression for optimum cutting speed
16. a) Explain the principle of working of tool dynamometers with sketches of any one type
b) What are the variables affecting tool temperatures? Explain the principle and working of a tool work thermo couple

MODULE 4

- 17 .a) What are the causes of tool damage? Explain the types of tool wear
b) Explain the properties of a good cutting fluid. How are cutting fluids classified? Explain
18. a) Define tool life and explain the parameters affecting tool life .How tool life is assessed in a metal cutting operation

b) State the characteristics, properties and applications of carbide, ceramic and diamond tools