



Q1. A machining operation producing chip thickness ratio is 0.35 when rake angle is 15° . Determine the shear strain in the work material.

Ans: 2.78

Q2. The rake angle of a cutting tool is 10° , shear angle 35° and cutting velocity 25 m/min. Calculate the velocity of chip along the tool face.

Ans: 15.82 m/min

Q3. An orthogonal cutting of MS has the following data:

Cutting speed: 35 m/min

Depth of cut: 0.25 mm

Tool rake angle: 10°

Chip thickness: 0.8 mm

Cutting force: 925 N

Thrust force: 475 N

Using Merchant's analysis, what is the friction angle during the machining?

Ans: 37.18°

Q4. As tool and work are not in contact in EDM process

- a) No relative motion occurs between them
- b) No wear of tool occurs
- c) No power is consumed during metal cutting
- d) No force between tool and work occurs

Q5. A cylinder is turned on a lathe with orthogonal machining principle. Spindle rotates at 200 rpm. The axial feed rate is 0.25 mm per revolution. Depth of cut is 0.4 mm. The rake angle is 10° . In the analysis, it is found that the shear angle is 27.75° . What is the thickness of the chip produced?

- a) 0.511 mm
- b) 0.528 mm
- c) 0.818 mm
- d) 0.846 mm

Answer: c

Q6. The mechanism of material removal in EDM process is

- a) melting and evaporation
- b) melting and corrosion



- c) erosion and cavitation
- d) cavitation and evaporation

Q7. In an orthogonal cutting test on MS, the following data were obtained:

Cutting speed: 40 m/min
Depth of cut: 0.3 mm
Tool rake angle: $+5^\circ$
Chip thickness: 1.5 mm
Cutting force: 900 N
Thrust force: 450 N

Using Merchant's analysis, the friction angle during machining is

- a) 26.6 degrees
- b) 31.5 degrees
- c) 45 degrees
- d) 63.4 degrees

Answer: b

Q8) In an orthogonal machining operation:

Uncut thickness: 0.5 mm
Cutting speed: 20 m/min
Width of cut: 5 mm
Chip thickness: 0.7 mm
Thrust force: 200 N
Cutting force: 1200 N
Rake angle: 15°

From Merchant's analysis, find the values of shear angle and shear strain.

Ans: 40.24° and 1.65

Q9) The percentage of total energy dissipated due to friction at the tool-chip interface is:

- a) 30%
- b) 42%
- c) 58%
- d) 70%

Ans: a

Q10) In orthogonal turning of low carbon steel bar of diameter 150 mm with uncoated carbide tool, the cutting velocity is 90 m/min. The feed is 0.24 mm/rev and the depth of cut



is 2 mm. The chip thickness obtained is 0.48 mm. If the orthogonal rake angle is zero, and the principal cutting edge is at angle 90° , what is the shear angle in degrees?

- a) 20.56
- b) 26.56
- c) 30.56
- d) 36.56

Ans: b

Q11) In EDM, if the thermal conductivity of tool is high and the specific heat of workpiece is low, then the tool wear rate and the MRR are expected to be, respectively

- a) high and high
- b) low and low
- c) high and low
- d) low and high

Q12) In orthogonal turning of medium carbon steel, the specific machining energy is 20 J/mm^3 . The cutting velocity, feed and depth of cut are 120 m/min, 0.2 mm/rev and 2 mm respectively. The main cutting force in N is,

- a) 40
- b) 80
- c) 400
- d) 800

Q13) In a single point turning tool, the side rake angle and orthogonal rake angle are equal. ϕ is the principal cutting edge angle and its range is $0^\circ \leq \phi \leq 90^\circ$. The chip flows in the orthogonal plane. The value of ϕ is closest to (in degrees)

- a) 0
- b) 45
- c) 60
- d) 90

Ans: a

Q14) Orthogonal turning is performed on a cylindrical workpiece with shear strength of 250 MPa. The following conditions are used; cutting velocity is 180 m/min, feed is 0.20 mm/rev, depth of cut is 3 mm, chip thickness ratio is 0.5. The orthogonal rake angle is 7° . Apply Merchant's theory to find the shear plane angle (in degrees) and the shear force (in N), respectively

- a) 52, 320
- b) 52, 400
- c) 28, 400



d) 28, 320

Ans: d

Q15) In orthogonal cutting of a bar of 100 mm diameter with a feed of 0.25 mm/rev, depth of cut is 4 mm and cutting velocity is 90 m/min. It is observed that the main (tangential) cutting force is perpendicular to friction force acting at the chip tool interface. The main cutting force is 1500 N. The orthogonal rake angle (in degrees) of the cutting tool is

- a) zero
- b) 3.58
- c) 5
- d) 7.16

Ans: a

Q16) With the same conditions as in Q15, what is the normal force acting at the chip tool interface in N

- a) 1000
- b) 1500
- c) 2000
- d) 2500

Ans: b

Q17) As the rake angle decreases or the friction at the tool chip interface increases,

- a) the shear angle increases and the chip becomes thinner
- b) the shear angle decreases and the chip becomes thicker
- c) the shear angle decreases and the chip becomes thinner
- d) the shear angle increases and the chip becomes thicker

Ans: b

Q18) Gray CI could be machined dry because

- a) its ductility is high
- b) its shearing strength is very low
- c) it reacts with cutting fluids
- d) graphite flakes act as solid lubricants

Q19) In orthogonal cutting, the chip thickness depends upon

- a) shear angle
- b) rake angle



- c) uncut thickness
- d) all of the above

Q20) Highest cutting temperature is possible with

- a) stellite
- b) tungsten carbide
- c) ceramics
- d) diamond