**Unit – I**

1. What are the velocities which come in to existence when a metal is cut orthogonally? Determine the mathematical relationship in terms of shear and rake angles.
2. a) Explain the various types of chips.

b) Draw Merchants force diagram. State the assumptions made in the development of such a diagram.

1. Explain the effects of the following parameters on chip formation:

(i) Velocity (ii) Material of work piece (iii) Depth of cut (iv) Tool Geometry.

1. a) In an orthogonal cutting experiment with a tool of rake angle =70, the chip thickness was found to be 2.5mm when the uncut chip thickness was set to 1mm.

(i) Find the shear angle,

(ii) Find the friction angle assuming that merchant’s formula holds good

b) A carbide-cutting tool lasted for 150 min while machining M.S at 35 m/min. If a similar tool is used at 30% higher speed to machine M.S. Calculate the tool life. Also calculate the value of cutting speed if the tool is to machine for 2 hours. Assume n=0.3 in Taylors tool life equation VT n = C.

1. Explain the merchant’s circle diagram and find the equations of stress, shear stress and strain.
2. a) What are the types of chips? Explain them.

b) Explain the factors influencing the tool life?

**Unit – II**

1. a) Describe briefly about taper turning methods?

b) What are the different types of lathe attachments? Discuss any one briefly.

1. Draw the neat diagram of engine lathe and describe the main parts and controls briefly.
2. a) With a neat sketch describe the turret indexing mechanism.

b) What are the advantages of turret lathe over the engine lathe?

1. a) Explain the thread cutting procedure on a lathe in detail.

b) A shaft 500mm long has a taper of 100mm/m for a distance of 200mm from one end. The maximum diameter of the shaft is 150mm. Determine the amount of set over required.

1. a) Explain briefly the following lathe accessories:

(i) Driving Plate (ii) Lathe Centres.

b) Explain briefly the following operations with neat sketches:

(i) Knurling (ii) Forming.

1. How are the automatic lathes classified briefly? Explain them.

**Unit- 3**

1. a) What is planar? Illustrate and describe its working principle with a neat sketch?

b) Distinguish between a shaper and a planar?

1. a) Describe the automatic feed of the shaper table with a suitable sketch.

b) List the shaper driving mechanisms and explain any one.

1. a) What is the principle of working of shaper and explain its construction with a neat sketch?

b) State the advantages, limitations and applications of shaper.

1. a) Sketch and explain the working of Slotting machine.

b) Describe the principle of a hydraulic drive quick return mechanism for a shaper.

**Unit- 4**

1. a) Explain the following milling operations:

i) Straddle milling ii) Gang milling

b) Sketch and describe a vertical milling machine.

1. List out the indexing mechanism and describe any one indexing method with its merits and demerits.
2. Explain briefly with neat sketches:

i) Conventional milling process ii) form milling

1. a) list out the specifications of milling machine?

b) Explain with a neat sketch about a horizontal milling machine.

1. a) Describe the construction of milling cutters.

b) What are the differences between face milling and end milling? Explain their applications.

1. a) Explain briefly the following with neat sketches:

(i) End milling (ii) Dove-tail milling.

b) Describe schematic diagram of universal milling machine.

1. a) What are the types of cutters? Explain any four.

b) Discuss the differential indexing method with a neat sketch

**UNIT-5**

1. a) What are the principles of clamping? Explain various types of clamps.

b) Explain briefly the deep hole drilling machine

1. a) Explain briefly “Twist drill nomenclature” with neat sketches.

b) Discuss the following jigs with a neat sketch.

i) Template Jig ii) Leaf Jig

1. a) Explain the working principle of Jig boring machine with a neat sketch.

b) How does a radial drilling machine work?

1. Discuss in detail the following with neat sketches:

a) Radial drilling machineb) Sensitive drilling machine.

1. a) Discuss in detail the following with neat sketches:

i) Drilling operations (ii) Jig boring machine.

b). Explain briefly the following fixtures:

(a) Grinding fixtures, (b) Milling fixtures

1. a) Explain with a neat sketch the feed mechanism used on drilling machines.

b) Describe horizontal boring machine with a neat sketch and write the specifications of boring machines.

1. a) Differentiate between multi-spindle and gang drilling machines.

b) Explain with neat sketches any five machining operations performed on vertical boring machines

**Unit – VI**

1. Explain the process of precision grinding with a neat sketch.
2. Explain with a neat sketch a plane cylindrical grinder.
3. Bring out the differences between Lapping and Honing.
4. Sketch and explain the tool and cutter grinding machine.
5. Explain with a neat sketch “Centreless internal grinding”.
6. Name the various types of abrasive bonds and explain them in detail.