Q-1 Discuss the mechanism of metal cutting in detail with relevance of shear angle.

Q-2 a) How do you define tool life? Explain the parameters that control the tool life of a single point cutting tool.
(b) What are the basic requirements of cutting fluids in metal machining? Explain with their main applications.
final equations.

b) Discuss the nature of friction found in metal cutting. How do you explain for the large value of apparent friction coefficient found in metal cutting?

Q-3 Determine the shear angle and various forces acting on the cutting tool during an orthogonal cutting test when V= 195 m/min, rake angle = 12, b = 1.75 mm, t = 0.25 mm, average coefficient of friction = 0.52 and shear stress = 385 N /mm2

Q-4 a) Draw the tool geometry of a single point cutting tool and show different angles.
b)) What are the major properties required of cutting tool materials? Explain with suitable example.

Q-5 What is meant by Built-Up-Edge (BUE)? With a neat sketch explain the formation of a BUE. Explain the conditions which promote the growth of BUE along with its consequences.

Q-6 a) What are the condition that would allow a continuous chip to be formed in metal cutting?

b) From the machining performance view point which type of chip is preferred? Explain your answer with suitable justifications? Also show the conditions which favor such a chip formation.

Q 1. Answer the following:
(a) Discuss the concept of orthogonal and oblique cutting
(b) Explain two types of wear related to grinding wheel.
(c) Discuss the concept of Standardization and Interchangeability
(d) Discuss the concept of surface roughness.
(e) Discuss relevance of shear angle in metal cutting.

Q. 2. Answer the following
(a) Discuss Honing process from a view point of tool movement, surface finish and accuracy achieved.
(b) Discuss the working of center-less grinding process with specific applications.

(c) Differentiate shaper, planner and Slotter Machine.

Q.4. Answer the following
(a) Discuss with neat sketch Electric Arc Welding process. Also discuss about straight & reverse polarity.
(b) Write short notes on the following:
    (a) HAZ (b) Tolerances (c) Friability

(c) In an orthogonal cutting operation of steel component using carbide tool the following data is obtained: Rrake angle- 10, width of chip- 6 mm, uncut chip thickness- 0.10 mm, chip thickness ratio- 0.33, cutting force- 1290 N, thrust force- 1650 N. Sketch the force diagram and calculate mean shear stress on the shear plane
Q. 5. Answer the following

(a) Discuss working principle of Resistance welding and explain the working of Projection welding

(b) Discuss working of Shielded Metal Arc Welding process with its applications.

(c) Discuss with neat sketch working of Ultra sonic machining process with specific applications.

Q.6. Answer the following

(a) Derive the expression for maximum chip thickness in milling.

(b) Discuss with neat sketch working of Abrasive Jet machining (AJM) with specific applications

(c).Draw tool layout for hexagonal bolt with following details:

Material : MS, Diameter: 25 mm, Length: 80 mm, Thread length: 30 mm

Q 1. Answer the following:

(a) Discuss the fundamental mechanism of chip formation

(b) How is the energy in a machining process typically consumed? Explain

(c) What are the various forms of wear found in metal cutting.

(d) Discuss honing process

(e) Discuss relevance of shear angle in metal cutting.

Q. 2. Answer the following

(a) Discuss applications of various cutting tool materials with their composition.

(b) Sketch and explain drive mechanism used in shaper.

(c) Draw the tool geometry of single point cutting tool and explain various angles.

Q.4. Answer the following

(a) Classify various welding processes on the basis of
- (i)   Heat source
- (ii)   Pressure applied
- (iii)   Workpiece composition
- (iv)   Electrode used
- (v)   application

(b) Write short notes on the following:
- (a) Truing
- (b) Dressing
- (c) Friability

(c) In an orthogonal cutting operation of steel component using carbide tool the following data is obtained:

rake angle- 10, width of chip- 6 mm, uncut chip thickness- 0.10 mm, chip thickness ratio- 0.33, cutting force- 1290 N, thrust force- 1650 N. Sketch the force diagram and calculate mean shear stress on the shear plane

Q. 5. Answer the following

(a) Discuss working principle of Resistance welding and explain the working of

(i) Spot welding

(ii) Seam welding

(b) Write short note on the following

(i) Oxy-acetylene welding process

(ii) Plasma arc welding

(iii) Metal inert gas welding

(c) Discuss with neat sketch working of Ultra sonic machining process with specific applications.

Q.6. Answer the following
(a) Discuss tool layout for automatic lathes.
(b) Differentiate Capstan & Turret lathe
(c) Discuss the working of Dividing head used in milling machine with neat sketch.

1   Attempt the following:
  a) How is metal removed in metal cutting? Explain the process by giving any simple model to explain the metal removal process.
  b) What are the various types of milling cutters that are used in milling? Explain.
  c) How do you define tool life? Explain the parameters that control the tool life of a single point cutting tool.
  d) What are the basic requirements of cutting fluids in metal machining? Explain with their main applications.
  e) What are the factors that control surface finish in turning? How do you select the cutting process parameters for finish turning?
  f) What is the importance of tool layout in automats? What considerations one has to keep in mind while planning for a best tool layout?

Q.2   Attempt the following:
  a) What are the differences between an automatic lathe and a capstan lathe? Give an example of a component suitable for a capstan lathe with dimensions.

  b) Estimate the machining time during a step turning operation on lathe machine.
     The blank diameter is 40 mm, length is 100mm. The diameter has to be reduced to 32mm. Maximum depth of cut can be taken as 2mm. Feed during roughing can be taken as 0.22 mm/rev,& during finishing as 0.10 mm/rev. Finishing allowance can be taken as 0.60 mm.

   C)   Explain the construction of a dividing head giving the applications for which it can be used.
Q.3   Attempt the following:
  a) What are the important factors which need to be considered for specifying a grinding wheel? Explain with suitable example.
  b) What is the classification method that could be used for grinding machines? Give the applications of each variety of grinding machines.
  c) How does reamer differ from Twist drill? With a neat sketch, describe geometry of a hand reamer.

Q.4   Attempt the following:
  a) How an arc is obtained in arc welding? How do you specify an electric arc welding power source? Explain.
  b) Draw the different types of flames used in gas welding. How would you identify these flames? What are the specific uses of each of these flames?
  c) What are different type of power sources used in arc welding? What are the advantages and limitations of each?

Q.5   Attempt the following:
  a) Explain the centre-less grinding process. Also discuss with neat sketch In-feed & Through- feed centre-less grinding with its application. What are its advantages and disadvantages?

b) The following data were obtained from an orthogonal cutting test.
   Rake angle= 20^0 , Depth of cut = 6 mm, Feed rate = 0.25mm/rev, Cutting speed= 0.6 m/s,
   Chip length before cutting= 29.4 mm, Vertical cutting force= 1050 N, Horizontal cutting force = 430N, Chip length after cutting= 12.9 mm
   Using Merchant's analysis, calculate:
   Direction and magnitude of resultant force, Shear plane angle, Friction force and friction angle, and various energies consumed.

c) Describe the appearance and properties of neutral flame, reducing flame and oxidizing flame.