UNIT – I

1. a). What factors will greatly influence the cutting tool materials? Explain
   b). What is meant by tool signature? Describe tool signature of single point tool

2. a). Differentiate between orthogonal and oblique cutting methods
   b). Draw the merchants force diagram. State the assumptions made in the development of such a diagram

3. a). What are the forces acting in on a single point cutting tool as it is engaged to cut? Explain
   b). What are the various types of chips? Under what conditions is each formed?

4. a). What are the different cutting tool materials? Explain
   b). The following equation has been obtained when machining particular steel with HSS cutting tools having a 8,22,6,6,15,6. Tool signature 20=VT0.13 f0.77d0.37 A 90minutes tool life was obtained using the following cutting conditions V= 25mpm, f= 0.25mm and d= 2.5 mm Calculate the effect upon the tool life for 20% increase in the cutting speed, feed and depth of cut taking each separately

5. What is a planer? Explain the principal parts of planer with neat sketches.

6. Explain about parting operation, finish turning, grooving, under cutting and shoulder turning on lathe machines with proper sketches.

7. Write short notes on the following:
   (a) Chip breakers.
   (b) Advantage of negative rake angle.
   (c) Curling of chip.
   (d) Cutting speed.

8. (a) Briefly discuss about tool signature with an example.
   (b) What are the requirements of cutting tool?
   (c) What are the variables that influence the type of chip produced? And explain about continuous chip with built-up edge?

UNIT – II

1. a). Describe three important methods of holding work in lathe?
   b). Name and describe three methods of turning tapers on lathe

2. a). When are magnetic chucks used for lathe operations? Explain
   b). Describe the process of cutting internal threads on a lathe with suitable diagram
3. a). Describe with diagram the working of APRON and Half nuts lathe
   b). List and describe commonly used attachments on lathe with diagrams

4. a). Describe with diagrams some of the methods and equipment for holding work on a lathe
   b). draw the schematic diagram of engine lathe and mention various parts on it

5. Explain constructional features of various parts of lathe in detail with neat sketches.

6. (a) What are the various factors to be considered in selection of grinding wheel? Discuss each in detail.
   (b) Explain the cutting action in grinding.

7. Explain constructional features and applications of chuck, lathe centers, collets, carriers and catch plates, and faceplate of lathe machine.

8. What is the purpose of clamping? What factors govern the choice of a clamping device to achieve the purpose of clamping? Discuss in detail.

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UNIT – III

1. a). Differentiate between shaping, slotting and planning machines
   b). Describe with diagram the operation of cutting T- slots on a shaper

2. a). Sketch and describe the hydraulic mechanism for shaper
   b). Describe some of the methods used for holding work on shaper

3. a). Sketch and describe the slotted disc mechanism for slotter
   b). What are the different work holding devices used in planner? Explain with neat diagrams.

4. a). Describe the principle of operation of Planer with neat diagram
   b). What are the different planing operations? Explain any Two with neat diagrams

5. (a) Derive an expression for grinding chip thickness ratio.
   (b) Briefly discuss about chip breakers.


7. Explain the theory of grinding.

8. (a) How do you specify the lathe machine?
   (b) Discuss briefly about the chucks used in lathe machine.
   (c) Specify the type of lathe center with their figures and applications.
UNIT – IV

1. a). List the Differences between counter boring, counter sinking and spot facing
   b). Draw and show the various elements of a twist drill? Explain

2. a). What are the different types of drills? Explain with neat diagrams
   b). A 10mm drilled hole in a casting of 10mm thickness is to be brought in alignment by boring. Calculate the time taken in boring operation, assuming cutting speed 30m/min and feed 0.13mm/rev.

3. a). Find the time required for drilling a 18mm hole in a work piece having thickness 50mm. Assume cutting speed 12m/min and feed 0.2mm/rev. Neglect the length of approach.
   b). How to specify drilling machine? draw the schematic diagram of radial drilling machine and mention various parts on it

4. a). What are the tool holding devices used in drilling machine? Explain
   b). How to specify Boring machine? What are the different types of boring machines? Draw and describe the horizontal boring machine

5. (a) Describe in detail about lapping with suitable sketches.
   (b) Explain the tool life aspects of broaching, honing and lapping.

6. Explain the following:
   (a) Simple or plain indexing.
   (b) Differential indexing.

7. What is a milling machine? How do you classify the milling machine? Give the working principle of milling machine with a neat sketch. Mention the size and specification of milling machine.

8. (a) Calculate the differential indexing to give 73 divisions.
   (b) A gear is to have 14 teeth. What is the indexing movement required?
   (c) Explain Differential indexing.

UNIT – V

1. a). What are the common work holding devices used on milling machines? Explain with Diagrams?
   b). Name the various milling attachments? Explain universal milling with neat diagram

2. a). What are differences between Up milling Down Milling
   b). Describe with neat diagrams the various types of cutters commonly used on milling machine
3. a). How to specify Milling machine? What are the different types of milling machines? Draw and describe the column and knee type milling machine
   b). Explain the principle of differential indexing?

4. a). Explain tool geometry of milling cutters with neat diagram
   b). What are the different types of Milling machines? Draw and describe the vertical milling machine

5. (a) Name and explain various work holding devices used on a lathes
   (b) Describe the various grinding fixtures

6. (a) Write short notes on the following:
   i. Purpose of honing and principle of operation of honing.
   ii. Explain about honing machines.

7. (a) What heat treatments are given to manufactured broaches.
   (b) How push broaches differ from pull broach?

8. (a) What are the advantages and limitations of using centre less grinding?
   (b) Describe the dressing and balancing requirements in grinding

UNIT – VI

1. a). What are the various factors to be considered in selection of grinding wheel? Discuss each in detail
   b). What are the different types of grinding machines? Draw and describe the surface grinding machine

2. a). How to specify grinding machine? Draw and describe the cylindrical grinding machine
   b). what are the grinding wheel characteristics? Discuss the effect of each.

3. a). Describe the various types and kinds of abrasives.
   b). What are the different types of grinding machines? Draw and describe the tool and cutter grinding machine

4. a). Describe wheel truing and dressing with neat diagrams.
   b). What are the different types of special grinding machines? Draw and describe any one machine.

5. (a) Classify the milling cutters according to the method of mounting the cutter.
   (b) Write a note on the carbide-tipped milling cutters.

6. Write a short note on the following:
(a) Horizontal boring machine.
(b) Deep hole boring machine.
(c) Fine boring machine.

7. Write short notes on the following:
   (a) Elements of drilling machine.
   (b) Elements of vertical boring machine.

8. (a) Write about work holding devices of drilling machine with suitable sketches.
   (b) Explain about deep hole drilling machine and portable drilling machine with neat sketches.

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**UNIT – VII**

1. a). What is broaching? Describe continuous type broaching machine with neat diagram
   b). what are the parameters affecting the performance of honing process? Explain

2. a). What are the principle types of broaching machines? Describe horizontal pull type broaching machine with neat diagram
   b). what are the parameters affecting the performance of lapping process

3. a). what are the Advantages and Limitations of Broaching

4. a). What are the principle types of broaching machines? Describe horizontal pull type broaching machine with neat diagram
   b). what are the parameters affecting the performance of lapping process

5. (a) Calculate the time taken in seconds for a high-speed steel drill 10mm diameter to penetrate a 18mm thick steel plate. Assume a feed of 0.2mm/rev for the 12mm size drill and cutting speed for steel as 20m/min.
   (b) Explain the double column jig-boring machine with a neat sketch.

6. (a) Compare compressed air and hydraulic power as means for operating clamping devices.
   (b) What do you understand by principle of least points and principle of extreme Points.

7. (a) Explain in detail the Quick return mechanism of ram in shaper with neat sketch.
   (b) Explain about the quick-return mechanism for a planer table.

8. How shapers are classified? Explain in detail the Quick return mechanism of ram in shaper with neat sketch.

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**UNIT – VIII**

1. a). What are the important principles of jig design? Explain
   b). What are the common types of drilling jigs? Explain any two with neat sketches
2. a). What are the various types of milling fixtures? Explain any two with neat sketches
   b). What are the main differences between the jigs and fixtures?

3. a). What are the different types of jigs? Explain any two with neat sketches
   b). What are the different locating devices? Explain any two with neat sketches

4. a). What are the basic rules considering while designing a clamp? Explain
   b). Write short note on the following i). Cam operated Clamps, ii). Screw Clamps

5. Sketch and explain the following grinding processes.
   (a) Form Grinding.
   (b) Gear tooth grinding.
   (c) Thread grinding.
   (d) Cam grinding.

6. Design a nine-speed gearbox for the headstock of a lathe, the spindle ranges from 28 RPM to 1000 RPM. Draw the structural diagram and show the layout of the gears and connection to motors.

7. (a) What is meant by `Clearance' and `fool proofing' as applied to jigs and fixtures.
   (b) Enumerate the design principles of milling fixtures.

8. (a) Sketch a broaching tool and explain various elements.
   (b) Why robust fixtures are required to support jobs to be broached?