Design for machining

Multiple choice questions

1) Which one of the following process is not a machining process?

   A) Planing  
   B) Boring  
   C) Turning  
   D) Forging

2) The angle made between the rake face of a tool and the normal to a workpiece is called

   A) Clearance angle  
   B) Rake angle  
   C) Lip angle  
   D) Helix angle

3) What is the disadvantage of the machining processes?

   A) Machining processes cannot produce complex geometries.  
   B) Machining processes cannot produce dimensions to very close tolerances.  
   C) In machining processes there is loss of material in the form of chips.  
   D) Only a few numbers of materials can be machined.

4) Which one of the following is not a guideline for the designing of the machined parts?

   A) Whenever possible machining processes should be used to manufacture a part.  
   B) Sharp corners and sharp points in the cutting tool should be avoided.  
   C) Avoiding interrupted cuts, undercutting.  
   D) Providing relief space for the burr removal.
5) The effect of reduction in grain size of a material

A) Improves machinability, Reduces Finishability, Reduces Tool life.
B) Improves machinability, Improves Finishability, Reduces Tool life.
C) Improves machinability, Reduces Finishability, Improves Tool life.
D) Reduces machinability, Reduces Finishability, Reduces Tool life.

**Design for turning operation**

**Choose the best answer:**

1) Which of the following tool is used for turning?
   a) Multi point cutting tool b) Single point cutting tool c) Hand tool d) End cutting tool

2) Which of the following is a conventional machining process?
   a) Chemical machining   b) Ultrasonic machining
c) Turning Operation   d) Abrasive jet machining

3) Turning is an operation in which
   a) Work piece rotates and tool reciprocates
   b) Work piece is fixed and tool rotates and reciprocates
   c) Tool is fixed and work piece reciprocates
d) Tool rotates and work piece reciprocates

4) In turning metal removal takes place by
   a) Plastic deformation    b) Plastic deformation and shearing
c) Shearing    d) None of these

5) Turning operation is carried out in
   a) Milling machine  b) Drilling machine  c) Shaper  d) Lathe

**Answer the following questions**

1) On what factors does dimensional control of turning depend?

2) What kind of parts minimizes the deflection from cutting tool?

3) How is edge relief for tool provided for facing large shoulders?

4) How are sharp corners and burrs minimized?

5) Why are grooves with parallel and steep sidewalls in parts avoided?

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**Designing for machining round holes**

**Multiple choice questions**

1) Which process used to enlarge the existing round hole to the required accurate size and smooth finish?
   a) boring
   b) reaming
   c) drilling

2) In the drilling process, the drill bit should be always ___________ to the drilling surface.
   a) Parallel
b) Angular

c) Perpendicular.

3) Which is the costliest process for making round holes?

a) drilling

b) boring

c) reaming

4) Accuracy of the drilled holes depends on

a) correctness of drill sharpening

b) Thermal coefficient of expansion of material

c) Drill bushing

d) All of the above

5) In reamed holes, what is the recommended tolerance for the hole diameter over 50 mm?

a) ± 0.025

b) ± 0.05

c) ± 0.08

Parts produced by milling

Answer the following questions

1. In milling operation, materials having higher hardness require the cutting speed and feed per tooth.
   A) Higher cutting speed and reduced feed
   B) Lower cutting speed and increased feed
   C) Lower cutting speed and reduced feed
   D) Higher cutting speed and increased feed
2. Which type cutters are more prone to vibration, chatter, and deflection of tool and machine components?
   A) Small size  
   B) Large size  
   C) Both  
   D) None

3. In peripheral milling, the machining is performed by cutting edges
   A) On both the ends of the cutter  
   B) On the outside periphery of the cutter  
   C) Both A and B  
   D) None

4. Which one milling process is an economical approach if product design permits stacking or slicing operations?
   A) Plain milling  
   B) Face milling  
   C) Form milling  
   D) Spot facing

5. Which type of materials is processed by milling process?
   A) Ferrous  
   B) Nonferrous  
   C) Both A and B  
   D) None

6. Write the types of milling operation.

7. Which process is quicker and more economical than face milling is preferred to produce small and flat surface?

8. Why it is not recommended to blend the formed surface to an existing milled surface?

9. When it is recommended to avoid milling?

10. Why clearance is provided for milling cutter?

   **Parts produced by planning, shaping and slotting**

   **Answer the following questions**

1. In shaping operation, the speed motion is accomplished by
   A) The work piece  
   B) The moving cutting tool  
   C) Both A and B  
   D) None

2. Parts used in shaper compare with those run on planners are usually
   A) Same  
   B) Larger  
   C) Smaller  
   D) None

3. What is the effect of decreasing grain size on tool life
4. Slots and contours should not be longer than ___________ the largest dimension of the hole diameter
   A) 4 times  
   B) 2 times  
   C) 6 times  
   D) Same

5. What is the effect of decreasing heat conductivity on tool life
   A) Reduces  
   B) Improves  
   C) No effect  
   D) Depends on material

6. In planning the motion is accomplished by the ____________.

7. What should be done if multiple surfaces that are not parallel in the direction of reciprocating motion of the cutting tool and why?

8. Why machined surfaces are preferred in the same plane?

9. Inaccessible surfaces those cannot be machined with other types of equipment scan be produced by __________.

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**Design for broached parts**

**Choose the best answer:**

1) Which of the following is not a design recommendation for broaching?
   a) A part to be broached should be designed so that it can be easily located
   b) The forged parts should be kept as close dimension as possible, allowing only minimum stock for finishing
   c) Thin wall sections are to be provided
   d) If similar broaching operation is to be carried out for a group of parts, then it is advisable to design the parts in such a way that same broaching tool is used

2) What is broaching?
   a) Broaching is the cutting of a machinable material using single point cutting tool by moving the tool linearly relative to the work in the direction of tool axis
b) Broaching is the cutting of a machinable material using multiple tooth cutting tools by moving the tool linearly relative to the work in the direction of tool axis.

c) Broaching is the cutting of a machinable material using multiple tooth cutting tools by moving the tool perpendicularly relative to the work in the direction of tool axis.

d) None of these

3) Which of the following metals can be broached?
   a) cast irons
   b) bronze
   c) aluminum
   d) all of these

4) Which of the following does not require broaching operation?
   a) Square, circular or irregular holes
   b) Gears and ratchets
   c) Cam forms
   d) None of these

5) The factor affecting size and surface and surface finish in broaching is
   a) Proper tool design
   b) Consistency of datum faces
   c) Strength of the part
   d) Uniformity of material
Answers:

Design for machining

1) D
2) B
3) C
4) A
5) B

Design for turning operation

1) b 2) c 3) a 4) c 5) d

6) Dimensional control in turning operation is inversely related to the size and length of work piece.

7) Short and stocky parts minimize the work deflection from the cutting tool.

8) When parts with large shoulders or other areas are to be faced, the surface should be 2 to 3° from the plane normal to the axis of the part. It provides edge relief to the cutting tool.

9) Sharp corner and burrs can be minimized by putting chamfers or curved surfaces at the intersection of the other surfaces.

10) Creating grooves with parallel or steep sidewalls are not possible in one operation. So steep sidewalls are avoided in parts.
Designing for machining round holes

1) Reaming

2) Perpendicular.

3) Boring

4) All of the above

5) ± 0.08

Parts produced by milling

1. (C) 2. (A) 3. (B) 4. (C) 5. (C)
6. There are two types of milling operation: (a) Peripheral milling and (b) Face milling.

7. Spot facing.

8. Because exact blending is difficult to achieve in case of form-milling or machining rails.

9. It is recommended to avoid milling at parting lines, flash areas, and weldments for higher cutter life.

10. It is necessary to provide clearance to allow the use of larger-size cutters in order to permit high material-removal rates.

Parts produced by planning, shaping and slotting

1. (B) 2. (C) 3. (A) 4. (A) 5. (A)

6. In planning the motion is accomplished by the work piece.
7. Multiple surfaces that are not parallel in the direction of reciprocating motion of the cutting tool are to be avoided otherwise these would require additional setups.

8. It is preferred to have machined surfaces in the same plane to reduce the number of operations required. (Exception: multi-tooled planer can machine both surfaces simultaneously).


Design for broached parts

(1). c
(2). b
(3). d
(4). d
(5). a