

III B.Tech II Semester Regular Examinations, Apr/May 2008
TOOL DESIGN
(Production Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is the primary use of high speed tool steels?
(b) Why grey cast iron is used as the main body of the jigs and fixtures? [8+8]
2. Listout the constituent elements of cermets and ceramics. What characteristics are imparted to the tool with the addition of these elements? Explain in detail. [16]
3. (a) Describe briefly about the margin and body clearance of a drill.
(b) How does the rake angle affects the chips being cut? Explain. [8+8]
4. (a) What is the difference between drilling tool and reamer?
(b) Explain about the adjustable and carbide tipped reamers. [8+8]
5. (a) Explain the importance of clearance in blanking and punching operators.
(b) Explain the various methods for reducing punch load. [6+10]
6. (a) Explain various methods of retaining metal in draw dies.
(b) A cup 105 mm inside diameter and 90 mm deep is to be drawn from steel sheet 1 mm thick. Determine the blank diameter and a suitable punch diameter for the first draw. Give the probable dimensions of the cup obtained from the first draw and estimate the press capacity. [6+10]
7. (a) What is meant by V location? Show by sketch how V location can be applied to locate a small lever.
(b) What are the important points to watch in respect of clamping? How should clamps be disposed of with respect to location points? [8+8]
8. (a) State and explain Taylor's principle of limiting gauging.
(b) Discuss briefly various aspects for deciding the tolerance on limit gauges. [8+8]

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1. What are the different types of tool materials? Explain their relative characteristics and applications. [16]
2. Discuss the influence of velocity, feed and depth of cut on the cutting temperature, metal removal rate and surface finish. [16]
3. (a) What happens if the cutting edges of a drill are equal, but lips are not equal?
(b) Explain the letter series and metric series of the drill sizes. [8+8]
4. (a) Explain about the chucking reamers and carbide tipped reamers.
(b) How the chatter of the reaming can be avoided? Explain. [8+8]
5. (a) What are the various types of dies used in press working? Describe them in detail.
(b) A hole 100 mm diameter is to be punched in steel plate 5.6 mm thick. The material is Cold rolled 0.4% C steel for which ultimate shear strength is 550 MPa. With normal clearance on the tools, cutting is completed at 40% penetration of the punch. Give suitable diameter for punch and die and a suitable shear angle for the punch in order to bring the work within the capacity of a 30 tonne press. [6+10]
6. (a) Explain various methods of retaining metal in draw dies.
(b) A blank has a perimeter of 31.75 cm. The metal is 1 mm thick cold worked 0.15% Carbon steel with shear strength of 420 N/mm² and percent penetration of 25. Two holes of 1.25 cm diameter each are to be pierced during the same stroke when the piece is blanked. What are the forces required for blanking and for piercing? What is the maximum force the press must exert at any one time without shear? What energy is required per stroke? [6+10]
7. How are different types of fixtures classified? Explain their specific applications. [16]
8. (a) State and explain Taylor's principle of limiting gauging.
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1. (a) What are oxide cutting tool material? Explain their applications.
(b) What are sintered carbides? What are their special characteristics and applications? [8+8]
2. (a) Explain how the nose radius effects the functioning of single point cutting tools?
(b) Explain the design features of HSS and carbide tipped tools. [8+8]
3. (a) Estimate the moment, thrust force and power required for 12.7 mm drill having a feed of 0.254 mm/rev, turning at 100 rpm, cutting steel of Brinell hardness 200. Take material factor $K = 1.1$.
(b) Define the following drill elements using suitable sketches.
 - i. Body
 - ii. Flute spaces
 - iii. Axis of the drill
 - iv. Cutting edges. [8+8]
4. Listout and explain in detail the significance of important elements of a reamer. [16]
5. (a) How is the amount of pressure required to strip the stock material from the punches determined?
(b) What is the result of excessive die clearance?
(c) What are the two general classifications of strippers? Explain briefly. [3+3+10]
6. (a) What are the three principal classes of available low - carbon sheet steel for drawing purposes?
(b) What methods are used to remove the work piece from the punch or die cavity after a forming operation? Explain briefly. [8+8]
7. (a) Enumerate the design principles of drill jigs.
(b) Explain with the aid of suitable sketches, the various indexing devices.
(c) Why should a jig have four feet and not three? Explain the reasons. [4+6+6]
8. (a) Discuss the various materials used for gauge manufacture.

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- (b) Discuss briefly various aspects for deciding the tolerance on limit gauges.
[6+10]

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4. (a) Explain about the chucking reamers and carbide tipped reamers.
(b) How the chatter of the reaming can be avoided? Explain. [8+8]
5. (a) Where will you prefer press working over metal cutting for the production of metal components, and why?
(b) How are the dies classified according to their construction? Describe different types. [6+10]
6. Explain various types of forming dies with neat sketches. [16]
7. How are different types of fixtures classified? Explain their specific applications. [16]
8. (a) Compare single impression dies and multi ? impression dies.
(b) Describe the various preliminary operations done on a multi - impression die. [6+10]
