Faculty of Engineering & Technology

Seventh Semester B.E. (Mech. Engg.) (C.B.S.)

Examination

ELECTIVE—I : TOOL DESIGN

Time—Three Hours]   [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1)   All questions carry marks as indicated.

(2)   Solve Question No. **1 OR** Question No. **2**.

(3)   Solve Question No. **3 OR** Question No. **4**.

(4)   Solve Question No. **5 OR** Question No. **6**.

(5)   Solve Question No. **7 OR** Question No. **8**.

(6)   Solve Question No. **9 OR** Question No. **10**.

(7)   Solve Question No. **11 OR** Question No. **12**.

(8)   Due credit will be given to neatness and adequate dimensions.

9. (a) Distinguish between Bending, Forming and Drawing operations. Also explain the material flow in Drawing. 7

(b) What is forging ? Explain the basic rules for die design for upset forging. 6

OR

10. (a) Explain in brief various forming operations. State the application of each. 6

(b) A cap is to be made having inside diameter of 50 mm and height of 90 mm.

Determine :

(i) Number of draws

(ii) Dimensions of punch and die block for successive draws. 7

11. (a) Explain the six point location principle applied to the design of jigs and fixtures. 7

(b) What is Drill Bushing ? What are the design principles of Drill Bushing ? Explain. 7

OR

tool, the following observations have been made :—

Depth of cut	=	2 mm
feed	=	0.2 mm/rev
Speed	=	150 m/min
Tangential cutting force	=	1200 N
Thrust force	=	750 N
Chip thickness	=	0.39 mm

Calculate :

Shear force, Normal force at shear plane, Friction force, Kinetic coeffieient of friction, Specific cutting energy. 7

(b) Describe the geometry of a Twist-Drill stating the significance of Helix angle, Point angle and Rake angle. 6

OR

4. (a) A high speed steel tool is used for maching a work piece of Mild steel. While machining at a cutting speed of 30 m/min the useful tool life is found to be 1.2 hours. What will be the tool life if the same tool is used to cut at a speed of 50 m/min, other parameters remaining the same ? Assume the value of exponent (n) of standard Taylor's tool life equation = 0.15. 7

(b) A hole of 25 mm diameter and 62.5 mm depth is to be drilled. The suggested feed is 1.25 mm per rev. and cutting speed is 60 rpm. What are the feed speed, spindle rpm, and cutting time ? Assume the clearance height is 5 mm. Also find MRR.   6

5. (a) Describe the geometry of Milling Cutter. Explain its various design parameters.   7

(b) Evaluate the cutting parameters for the slab milling operations for the following data : Diameter of milling cutter = 100 mm, cutter speed = 500 rpm, width of cutter = 100 mm, depth of cut = 5 mm, table feed = 100 mm/min, length of workpiece = 50 mm, width of workpiece = 80 mm, number of teeth in the cutter = 8.   6

OR

6. (a) Draw a neat sketch to explain the geometry of a broach. Describe its various elements and types.   7

(b) Write short notes on (any **TWO**) :—

(1) Compound die

(2) Progressive die

(3) Combination die.   6

7. (a) What is press working ? Explain with neat sketches various press working operations.   7

(b) Find the total pressure, dimensions of tools to produce a washer 40 mm outside diameter with a 18 mm diameter hole from material 2.5 mm thick having a shear strength of 320 N/mm^2.   7

OR

8. (a) Explain the shearing action in cutting die. How are the clearances applied for Blanking and Punching dies ? Explain.   7

(b) A Blank is to be produced from SAE 1020 steel plate of thickness 2.5 mm. Outside diameter of Blank is 100 mm. Determine :

(i) Total tonnage required and press capacity.

(ii) Dimensions of punch and die block.

(iii) Amount of shear on Punch if cutting force is to be reduced by 20%.   7

(9) Assume suitable data wherever necessary.

(10) Illustrate your answers wherever necessary with the help of neat sketches.

(11) Diagrams and chemical equations should be given wherever necessary.

1. (a) Distinguish between orthogonal and oblique cutting.

6

(b) Describe the geometry of single point cutting tool. Explain the importance of various angles. 7

OR

2. (a) What is tool life ? Explain the various factors affecting tool life ? 6

(b) What are the desired properties of cutting tool material ? Also explain the different types of chips produced during metal cutting, stating the conditions under which they are formed. 7

3. (a) During machining of C-25 steel with 0 –10 –6 –6 –8 –90 –1 mm (ORS) shaped tripple carbide cutting

12. (a) Describe the various types of lever clamps. Draw neat sketches. 6

(b) Design an indexing Fig for drilling six equally spaced radial holes of 10 mm dia of PCD of 80 mm in a circular wokpiece of mild steel having dia = 110 mm and thickness = 30 mm. The workpiece has an axial hole of 20 mm. Draw neat dimensional sketch.

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