 2015

(Set-1)

M.Tech-2nd(PE)
Tools and Die Design

Full Marks : 70

Time : 3 hours

Q.No.1 is compulsory and answer any **five** from the rest

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

   (*a*) Differentiate interchangeability and standardization.

   (*b*) Write the use of chip breakers.

   (*c*) How is the pitch of a broach selected ?

   (*d*) What are form tools ?

   (*e*) What is forging draft ?

   (*f*) Why the position of parting line is so important ?

   (*b*) Write the advantages and limitations of upset forging. 4

7. (*a*) Explain the different methods of mounting piercing punches. 6

   (*b*) Sketch the various methods of holding punches. 4

8. (*a*) Describe the principle of pin location. 3

   (*b*) What is six-point location principle ? Explain it with the help of suitable sketches. 7

(*g*) What are the functions of stock stop and pilot ?

(*h*) Differentiate between blanking die and piercing die.

(*i*) Write the design principle of drilling jig.

(*j*) What is meant by clearance as applied to jigs and fixtures ?

2. (*a*) Classify the form tools. 5

(*b*) How is the geometry of a flat form tool worked out ? 5

3. In orthogonal cutting of a low carbon steel, the specific cutting energy is 4080 N/mm^2. The uncut chip thickness is 0·2 mm and the chip width is 5mm. The cutting speed is 1.1 m/s and the rake angle of the tool is 10°. Assuming co-efficient of friction at the tool-chip interface as 0·7, determine :

(*a*) the cutting force

(*b*) the average shear stress in the shear plane

(*c*) the normal stress on the shear plane

(*d*) the average shear strain in cutting

(*e*) the average shear strain rate. 10

4. (*a*) Describe the activities of standardization. 5

(*b*) Briefly describe the different steps in value analysis. 5

5. The bore of an alloy steel component prior to broaching is $32{\cdot}35^{+0.05}$ mm. The bore is to be finish broached to $32{\cdot}75^{+0.01}$ mm diameter. If the length of bore is 35 mm and the cutting speed is 0·15 m/s, determine the broaching power for broaching and design the broach. Shear stress = 45 N/mm^2, face angle = 10° and relief angle = 1·5° for roughing and 1° for finish. 10

6. (*a*) Explain the basic rules of die design for upset forging. 6