Time: 3 Hour **Max. Marks: 80**

N. B.
1) Question No.1 is compulsory.
2) Attempt any three questions from the remaining five questions.
3) All questions carry equal marks.

Q1. Attempt any four of the following: [20]
(a) Spring back effect and measures to control it.
(b) Explain with the help of neat sketch design aspects of Press tool elements .
(c) Explain different methods of mounting punches.
(d) How is the size of a blank calculated for drawing a cup?
(e) Sketch a 'push-through' and an 'inverted' draw die.

Q2. (a) (i) Determine the diameter of the hole that can be punched in a steel sheet of thickness 1.6 mm, for which the ultimate shear stress is 310 N/mm^2. Press Capacity is 250 KN. [10]
(ii) What will be the punch size if punching is the needed operation?
(iii) If the blank is to be drawn into a cup, determine the diameter of the cup after the first draw.
(b) Explain the basic construction & working of Combination dies. [6]
(c) Five holes of diameter 10 mm each to be punched in a sheet 3 mm thick at a pitch of 25 mm. What should be the minimum capacity of the press (in tons) if the yield point of the material is 50 MPa and one hole is punched per stroke? [4]

Q3. (a) A washer with 12.7 mm internal hole and outside diameter of 25.4 mm needs to be made from 1.5 mm thick strip of 0.2 percent carbon steel. the ultimate strength of material is 280 N/mm^2. a) find the total cutting force if both punches at the same time and no shear is applied to either punch or the die. b) what will be the cutting force if the punches are staggered, so that only one punch acts at a time. c) taking 60 % penetration and shear on punch of 1mm, what will be the cutting force if both punches act together. [10]
(b) Explain a) Steps in drawing operation b) Classify press working operations. [10]

Q4. (a) Defects in drawn parts in detail [10]
(b) Determine the capacity of the double bending die for the following data. [10]
Sheet metal thickness =1.5 mm
Sheet metal width at bend = 60 mm
Die radius =3 mm
Punch radius = 1.5 mm
Die clearance = 1.25 mm
Tensile strength = 315 MPa
Setting pressure = 560 MPa
Beads on punch = 2
Projected width of each bead = 3mm

Q5. (a) A steel cup of height 30 mm and internal diameter 40 mm with a flange width of 10 mm is to be deep drawn from a sheet 1mm thick. Determine the diameter of blank and the drawing force. What is the draw ratio? Can the cup be drawn in a single operation? [10]

(b) Explain overloading of presses criteria while selecting the press. [6]

(c) Sketch the various methods of applying shear to the punch and die. [4]

Q6. (a) Explain with sketch different types of sensors used for hand protection. [8]

(b) Explain different ways used for hand protection in press tool. [8]

(c) Draw and explain construction and working of shaving dies. [4]
