Subject Name: Forming and Machining Technology **Subject Code: PRPC14**
Time: 1:30 Hrs. **Maximum Marks: 30**

Instructions:

- *Answer all questions.*
- *Draw neat sketches wherever necessary.*
- *Make suitable **assumptions** wherever necessary.*
- *Write your **Name** and **Registration Number** at the top of each page.*

1. Discuss the true stress-strain curve for ductile and brittle material. **2**
2. Discuss the various parameters that affect the process of tube drawing. **2**
3. For rolling operations describe roll separating forces, torque on the roll, and the effect of front and back tension. **2**
4. Discuss the different variables that affect the deep drawing process. Determine the diameter of the blank to produce a shell of 240 mm diameter and 120 mm height by the deep drawing of a 6 mm sheet metal. **3**
5. Machining of steel is performed at cutting speed of 250 m/min, tool rake angle of 15°, the width of cut 3 mm, and uncut thickness 0.4 mm. The coefficient of friction between the tool and chip is 0.50. The work material has a shear strength of 360 MPa. Calculate the shear angle, and the cutting and thrust components of the machining force using Merchant's formula. **3**
6. What are the different defects in the Rolling process? What are their causes and remedial measures? In a rolling process, a 24 mm thick plate is rolled to 20 mm in a four-high mill. Determine the coefficient of friction if this is the maximum reduction possible. The roll diameter is 400 mm and σ_o= 100 N/mm^2 for hot rolls of mild steel at about 1100°C. **4**
7. What are the various process variables which control the rolling process? A 400-mm-wide strip 24 mm thick is fed through a rolling mill with two powered rolls each of diameter = 600 mm. The work thickness is to be reduced to 20 mm in one pass at a roll speed of 48 rev/min. The work material has a flow curve defined by K = 285 MPa and n = 0.18, and the coefficient of friction between the rolls and the work is assumed to be 0.13. Determine if the friction is sufficient to permit the rolling operation to be accomplished. If so, calculate the roll force, torque, and horsepower. **4**
8. Discuss the various parameters and their significance taking the example of a single-point cutting tool. In a certain machining operation, the lives of two tools, A and B, are governed by the following equations, respectively:

   $$V\,T^{0.125} = 2.5$$
   $$V\,T^{0.250} = 7$$

   where V is the cutting speed in m/s and T is the tool life in seconds. Calculate the cutting speed for which both the tools will have the same life. **4**
9. Write short notes on: **6**
   a. Defects in wire drawing
   b. Heat generation in the metal forming process
   c. Spinning
   d. Stretch forming