Roll No. .....

Total No. of Questions : 09] [Total No. of Pages : 02

B.Tech. (Sem. - 5th)

METAL FORMING

SUBJECT CODE : PE - 307

Paper ID : [A0217]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 x 2 = 20)*

a) Discuss in detail the industrial process used to improve fatigue resistance of the metal by setting up compressive stresses in is surface.

b) What is instability of point of stress-strain curve? How this point can be identified?

c) Why is spring back an important consideration in cold-forming process?

d) Why is flash desirable in closed-die forging?

e) What is neutral point in rolling process?

f) What is the primary shape limitation of extrusion process?

g) What measures can be taken to improve the quality of sheared edge in blanking?

h) Explain why the whole of the material put in the container for extrusion is not extruded.

i) What are the specific applications of hydrostatic extrusion?

j) How are collapsible tubes of aluminium manufactured? Explain with sketch.

Section - B

(4 x 5 = 20)

Q2) Draw the cross-section of a drawing die labeling various features of it.

Q3) Extrusion is a process involving three-dimensional compression; explain why brittle materials can be worked by extrusion more successfully than by some other metal working methods.

Q4) How is the parting line chosen in the case of drop forging operations? Explain with examples.

Q5) What is meant by counter locking of forging dies? Write the cause and effect of the same.

Q6) A 20 mm plate is to be reduced to 18 mm in a single rolling pass. Determine the roll force and torque per unit width when roll diameter is 500 mm and the stress-strain curve of work material is $\sigma = 600\, e^{0.22}$ MPa.

Section - C

(2 x 10 = 20)

Q7) What are the technological sequences of operations for forging a crank-hook for best mechanical properties? Sketch the various stages and name the operations.

Q8) (a) Estimate the force required for a 90 □ bending of St 50 steel of thickness 2 mm in a V die. The die opening can be taken as eight times the thickness. The length of the bent part is 1 m. (Take ultimate tensile strength of St 50 steel = 500 MPa).

(b) Explain the function of the following components with reference to sheet metal dies :

(i) Piolts, and

(ii) Back Gauges.

Q9) List the advantages of forging of metals. Distinguish clearly between drop forging and press forging processes with reference to the process and products obtained.