Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: B.Tech 3rd
Name of the Paper: Production technology
Paper Code: TME 309
Time: 3 hour Maximum Marks: 100

Note:

(v) All the questions are compulsory.
(vi) Answer any two sub questions from a, b and c in each main question.
(vii) Total marks for each question is 20 (twenty).
(viii) Each sub-question carries 10 marks.

Q1. (2 × 10 = 20 Marks)

a. Discuss the role of manufacturing in national development and the factors that affect manufacturing efficiency. (CO1)
b. Explain elastic and plastic deformation in metals and state their relevance in forming operations. (CO1)
c. A mold cavity of 40 cm × 20 cm × 10 cm is to be filled in 8 seconds. The gating ratio is 1:3:3, and metal discharge rate is 1.0×10^{-3} m³/s. Find the cross-sectional area of sprue, runner, and ingate. (CO2)

Q2. (2 × 10 = 20 Marks)

a. Explain the solidification process of metals and discuss factors affecting the grain structure. (CO2)
b. Compare Tresca and von Mises yield criteria with appropriate sketches. (CO3)
c. A billet 80 mm in diameter is reduced to 60 mm in height by forging. Given K = 420 MPa and n = 0.18, calculate the average flow stress and total forging load. (CO3)

Q3. (2 × 10 = 20 Marks)

a. Explain the concept of friction hill in forging and its impact on metal flow. (CO3)
b. Describe the different types of rolling mills and discuss their applications. (CO4)
c. A strip 30 mm thick is reduced to 25 mm using rolls of 400 mm diameter rotating at 80 rpm. Calculate the roll force and power if $\mu = 0.07$. (CO4)

Q4. (2 × 10 = 20 Marks)

a. Classify extrusion processes and explain the working of a hydrostatic extrusion setup. (CO4)
b. Describe the construction and working of a resistance spot welding machine with neat sketches. (CO4)
c. A billet 100 mm in diameter is extruded to 50 mm diameter. If the extrusion constant K = 280 MPa, find the extrusion pressure and work done per unit volume. (CO4)

Q5. (2 × 10 = 20 Marks)

a. Discuss the thermodynamic aspects of welding and explain energy balance during fusion. (CO5)
b. Explain the various welding defects and suggest suitable preventive measures. (CO5)
c. During arc welding, heat input = 8 kJ/s and welding speed = 6 mm/s. If efficiency = 65%, calculate the heat input per unit length and the fraction of heat conducted away (assume 45%). (CO5)

Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.