

Reg. No.:

Name :

VIT<sup>®</sup>

Vellore Institute of Technology

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## Continuous Assessment Test-I- January 2023

Programme	B.Tech Mechanical Engineering	Semester	Fall 2022-23
Course Title	Metal Forming and Machining	Code	BMEE304L
Faculty	Dr.A. Giridharan	Class Nbr	CH2022235001709
Time	1 hour 30 Mins	Slot	F2+TF2
		Max. Marks	50

## Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1.		A 42.0-mm-thick plate made of low carbon steel is to be reduced to 34.0 mm in one pass in a rolling operation. As the thickness is reduced, the plate widens by 4%. The yield strength of the steel plate is 174 MPa and the tensile strength is 290 MPa. The entrance speed of the plate is 15.0 m/min. The roll radius is 325 mm and the rotational speed is 49.0 rev/min. Determine (a) the minimum required coefficient of friction that would make this rolling operation possible, (b) exit velocity of the plate, and (c) forward slip.	10
2.		A cylindrical part is warm upset forged in an open die. The initial diameter is 45 mm and the initial height is 40 mm. The height after forging is 25 mm. The coefficient of friction at the die-work interface is 0.20. The yield strength of the work material is 285 MPa, and its flow curve is defined by a strength coefficient of 600 MPa and a strain-hardening exponent of 0.12. Determine the force in the operation (a) just as the yield point is reached (yield at strain = 0.002), (b) at a height of 35 mm, (c) at a height of 30 mm, and (d) at a height of 25 mm.	10
3.		A cylindrical billet that is 100 mm long and 50 mm in diameter is reduced by indirect (backward) extrusion to a 20 mm diameter. The die angle is 90°. The Johnson equation has $a = 0.8$ and $b = 1.4$ , and the flow curve for the work metal has a strength coefficient of 800 MPa and strain-hardening exponent of 0.13. Determine (a) extrusion ratio, (b) true strain (homogeneous deformation), (c) extrusion strain, (d) ram pressure, and (e) ram force.	10
4.		Explain with a neat sketch the process used to make races for ball bearing.	10
5.		Is preparation of work/stock is mandatory in a bulk deformation process? If so why? Explain any three stock preparation techniques you adopt in a drawing process.	10