VIT

Reg. No. :

Final Assessment Test (FAT) - July/August 2023

Programme	**B.Tech.**	Semester	**Fall Inter Semester 22-23**
Course Title	**METAL FORMING AND MACHINING**	Course Code	**BMEE304L**
Faculty Name	**Prof. Mohan R**	Slot	A1+TA1
		Class Nbr	CH2022232500205
Time	**3 Hours**	Max. Marks	**100**

PART - A (10 X 10 Marks)
Answer any 10 questions

01. Draw the stress-strain curve for ductile and brittle material. Elucidate the difference between ductile and brittle fracture with suitable diagram. **[10]**

02. A 450 mm wide strip 50 mm thick is fed through a rolling mill with two powered rolls each of radius = 300 mm. The work thickness is to be reduced to 47 mm in one pass at a roll speed of 75 rev/min. The work material has a flow curve defined by K = 275 MPa and n = 0.15, and the coefficient of friction between the rolls and the work is assumed to be 0.12. Determine if the friction is sufficient to permit the rolling operation to be accomplished. If so, calculate the roll force, torque, and horsepower. **[10]**

03. A billet 100 mm long and 50 mm in diameter is to be extruded in a direct extrusion operation with extrusion ratio 5.0. The extrudate has a round cross section. The work metal has a strength coefficient 415 MPa, and strain-hardening exponent 0.12. Use the Johnson formula with a = 0.8 and b = 1.5 to estimate extrusion strain. Determine the pressure applied to the end of the billet as the ram moves forward. **[10]**

04. A face milling operation is used to machine 10 mm from the top surface of a rectangular piece of aluminum 400 mm long by 150 mm wide in a single pass. The cutter follows a path that is centered over the workpiece. It has five teeth and is 200 mm in diameter. Cutting speed = 3.0 m/s, and chip load = 0.3 mm/tooth. Determine (a) the actual machining time to make the pass across the surface and (b) the maximum metal removal rate during cutting. **[10]**

05. Elaborate on various stages involved in drawing cup shaped component using suitable sketch. **[10]**

06. Select a suitable metal forming process and explain in detail on how to deform the initial shape into final shape (refer figure below). **[10]**

Initial shape Final shape

07. What are the different types of abrasive grains used in a grinding wheel? Discuss in detail the characteristics of an abrasive grain **[10]**

08. The following data relate to the orthogonal cutting of a component **[10]**
Feed force 900 N, Cutting force 1800 N, Chip thickness ratio 0.26, Tool rake angle 12°
Determine compression force, shear force, coefficient of friction of the chip on the tool face.

09. List the various sub component involved in this assembly. And explain how you make each component [10]

10. During straight turning of a 24 mm diameter steel bar at 300 rpm (revolutions per minute) with an HSS tool, a tool life of 9 min was obtained. When the same bar was turned at 250 rpm, the tool life increased to 48.5 min. What will be the tool life at a speed of 280 rpm? [10]

11. Discuss the working principle of electrical discharge machining process and list its merits and demerits. [10]