Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2722801 **Date:28/05/ 2015**

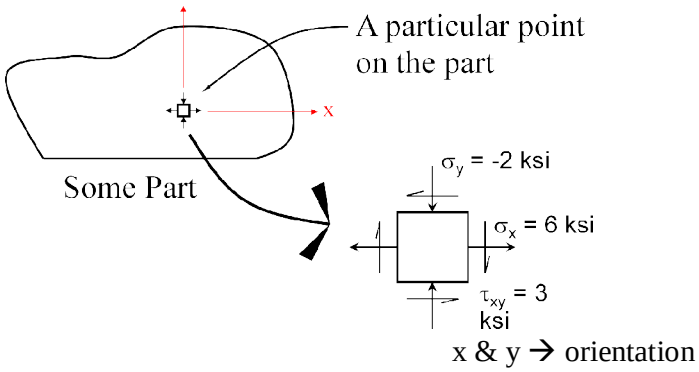
Subject Name: Mechanics of Metal Forming

Time: 2:30 PM – 5:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	What is Strain rate? Explain the effect of strain rate in metal forming.	07
	(b	State the fundamental conditions for stress - strain relations in plastic deformation. Explain the normality rule related to plastic stress strain relation.	07
Q.2	(a)	Derive the relationship between yield strength in Shear and Yield strength in tension according to Trescaôs hypothesis.	07
	(b)	Why most metals obey Von-Mises Yield condition? Explain it in detail.	07
		OR	
	(b)	Prove P=2K-ůx, By Slab Analysis for Sheet Drawing	07
Q.3	(a)	Prove that the angle between two slip lines of one family at points where they are cut by a slip line of the other family is constant along their lengths.	07
	(b)	The plane-strain flow stress, $\sigma 0$, of a metal is 200 MPa. A sheet 0.60 m wide and 3 mm thick is to be cold rolled to 2.4mm in a single pass using 30 cm diameter rolls. Assuming a coefficient of friction is 0.075, (a) Compute the roll pressure. (b) If front tension of 75 MPa were applied, what would be the average roll pressure?	07
		OR	
Q.3	(a)	Explain 3-dimensional Mohrôs Stress Circle. How does Mohrôs circle help in analysis of metal forming?	07
	(b)	Draw Mohrôs Circle from the following constraints.	07



Q.4	(a)	Explain bending in sheet metal forming. Show the various stresses in bending process.	07
	(b)	Explain about the factor which affects the yield strength.	07
		OR	
Q.4	(a)	List out the CAD/CAM applications in Extrusion, Forging and sheet metal forming.	07
	(b)	What is work hardening? How does it affect the mechanical properties?	07

Q.5	(a)	Describe basics of sheet metal forming. Explain Bending and Cold rolling theories in detail considering their criticalness in manufacturing.	07
	(b)	A thin-wall tube with closed ends is subjected to a maximum internal pressure of 35 MPa in service. The mean radius of the tube is 30 cm. Solve (i) If the tensile yield strength is 700 MPa,what minimum thickness must be specified to prevent yielding? (ii) If the material has a yield strength in shear of k = 280 MPa, what minimum thickness must be specified to prevent yielding?	07

OR

Q.5	(a)	What is Baushinger effect? Explain localized necking in biaxial stretching.	07
	(b)	Explain the concept of constitute relationship. State the general form of a constitutive equation and explain the importance of it.	07

****