Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3171921 Date:20-05-2024

Subject Name: Metal forming analysis

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What do you understand by forming of metal	**03**
	(b)	What is recrystallization? State its important in metal forming.	**04**
	(c)	Explain in detail Two-Dimensional Mohr's circle diagram for stress	**07**
Q.2	**(a)**	What is bending? Also explain bend angle and bend allowance with sketch.	**03**
	(b)	Elaborate board drop hammers used in forging process with neat sketch.	**04**
	(c)	Write short note on (1) forming limit diagram (2) anisotropy of sheet metal	**07**
		OR	
	(c)	What is Hencky's first theorem concerning slip lines in metal forming, and prove it with usual notations.	**07**
Q.3	**(a)**	Explain effect of (1) strain rate (2) Temperature (3) friction on metal forming process.	**03**
	(b)	Draw sketch of (1) Two high (2) three high (3) four high (4) cluster, rolling mill with usual notation.	**04**
	(c)	Describe Upper bound and Lower bound theorem in metal forming.	**07**
		OR	
Q.3	**(a)**	Explain (1) absolute draught (2) relative draught (3) co-efficient of elongation in rolling process	**03**
	(b)	Define for forging. (1) Flash (2) Cutter (3) Draft (4) Parting line	**04**
	(c)	Write short not on (1) hydrostatic extrusion and (2) Impact extrusion.	**07**
Q.4	**(a)**	A shell having 32 mm diameter and 108 mm height with a wall thickness of 0.8 mm is to be manufactured from 1.1 mm thick metallic sheet. Calculate the blank diameter.	**03**
	(b)	State and explain different materials used for making wire drawing dies.	**04**
	(c)	Explore the theory of slip lines from a different angle.	**07**
		OR	
Q.4	**(a)**	Calculate the bending force for a 45^0 bend of aluminium sheet 1.8 mm thick and 1200 mm long with a die opening 8 times the metal thickness. Take die opening factor 1.3 and ultimate tensile strength is 3400 kg/cm^2	**03**
	(b)	What is cutting force and how it reduces in sheet metal work.	**04**
	(c)	What you know about Isotropic and Kinematic work hardening explain with neat sketches.	**07**
Q.5	**(a)**	Explain relationship between extrusion ratio, temperature and pressure	**03**
	(b)	Explain Nesting in sheet metal work.	**04**
	(c)	Classify dies use in sheet metal and explain progressive die with neat sketch.	**07**

OR

Q.5	**(a)**	Explain function of pilot and state method of fitting of pilot.	**03**
	(b)	Define (1) Notching (2) Nibbling (3) Slitting (4) Perforating for press work.	**04**
	(c)	A steel washer is of 44 mm outer diameter and 25 mm inner diameter and is 12 mm thick. If maximum shear stress is 405 N/mm^2 and percentage penetration is 24 find (1) work done (2) shear to be ground if maximum punch force is to be reduced to.0.05 MN.	**07**

****