Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 – EXAMINATION – SUMMER 2026

Subject Code: 3142508 **Date: 25/05/2026**

Subject Name: Industrial Drafting and Machine Design

Time: 10:30 AM TO 01:00 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.**

Q.1	**(a)**	Define Poisson's ratio and modulus of rigidity.	**03**
	(b)	Derive the expression of moment of inertia for a rectangular section.	**04**
	(c)	A steel rod of 25 mm diameter is subjected to a tensile load of 50 kN. Calculate stress, strain and elongation ($E = 2\times10^5$ N/mm², L = 500 mm).	**07**
Q.2	**(a)**	Explain maximum shear stress theory with neat sketch.	**03**
	(b)	Define section modulus.	**04**
	(c)	A simply supported beam of 2 m span carries a point load of 10 kN at the center. Calculate maximum bending stress (take rectangular section 100×200 mm).	**07**
		OR	
Q.2	**(c)**	A column 3 m long, hinged at both ends, has a rectangular cross section of 150×200 mm. Find the critical load using Euler's formula ($E = 2\times10^5$ N/mm²).	**07**
Q.3	**(a)**	Define slenderness ratio.	**03**
	(b)	Write short note on nipping in leaf springs.	**04**
	(c)	A helical compression spring is made of wire 10 mm diameter, mean coil diameter 100 mm, and 12 active coils. Find stiffness and maximum shear stress for 1000 N load.	**07**
		OR	
Q.3	**(a)**	State assumptions made in torsion theory.	**03**
	(b)	State different types of couplings.	**04**
	(c)	Explain design procedure of cotter joint.	**07**
Q.4	**(a)**	Explain self-locking of screw with condition.	**03**
	(b)	List applications of knuckle joint.	**04**
	(c)	A square threaded screw of 40 mm diameter and 6 mm pitch lifts a load of 20 kN. Find efficiency and torque required ($\mu = 0.15$).	**07**
		OR	
Q.4	**(a)**	Define line of intersection.	**03**
	(b)	Explain rigid flange coupling with neat sketch.	**04**
	(c)	Construct intersection of cone and cylinder with neat sketch.	**07**

Q.5	**(a)**	Define MMC and LMC.	**03**
	(b)	Explain different types of fits with examples.	**04**
	(c)	Discuss importance of surface finish and roughness in machine drawing with suitable examples.	**07**

OR

Q.5	**(a)**	List different types of levers used in machines.	**03**
	(b)	Explain difference between solid and hollow shaft strength.	**04**
	(c)	Discuss role of GD&T in modern machine drawing with case examples.	**07**

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