Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 152503 **Date: 01/05/2017**

Subject Name: Design of M/c Elements - I

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.**

Q.1	**(a)**	Explain the following terms in connection with design of machine members subjected to variable load. (I) Endurance limit, (II) Size factor, (III) Notch sensitivity, and (IV) Surface finish factor.	**07**
	(b)	Explain different types of springs with neat sketch.	**07**
Q.2	**(a)**	A simple band break operates on a drum of 600 mm in diameter that is running at 200 rpm. The coefficient of friction is 0.25. The brake band has a contact of 270° , one end is fastened to a fixed pin and the other end to the brake arm 125 mm from the fixed pin. The straight brake arm is 750 mm long and placed perpendicular to the diameter that bisects the angle of contact. (a)What is the pull necessary on the end of the brake arm to stop the wheel if 35 KW is being absorbed? (b)What width of steel band of 2.5 mm thick is required for this brake if maximum tensile stress is not to exceed 50 MPa ?	**07**
	(b)	Design procedure for Fast and loose Pulleys.	**07**
		OR	
	(b)	Discuss design criterion for V-belt pulley.	**07**
Q.3	**(a)**	Name the methods used to design thick cylinder to withstand internal pressure equal to or greater the allowable working stress. **A**lso show the stress distribution across the wall thickness due to shrinkage fitting and internal fluid pressure.	**07**
	(b)	A compression coil spring made of an alloy steel is having the following specifications: Mean diameter of coil = 50 mm; Wire diameter = 5mm; Number of active coils = 20. If this spring is subjected to an axial load of 500 N; calculate the maximum shear stress (Neglect the curvature effect) to which the spring material is subjected.	**07**
		OR	
Q.3	**(a)**	What do you meant by Nipping of springs? Explain.	**07**
	(b)	A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2, find the axial load which the spring can carry and the deflection per active turn.	**07**
Q.4	**(a)**	A Triple threaded worm has teeth of 6 mm module and pitch circle diameter of 50 mm. If the worm gear has 30 teeth of 14.5° and the coefficient of friction of the worm gearing is 0.05, find, 1. Lead angle of the worm 2.Velocity ratio 3. Centre distance 4.Efficiency of the worm gearing	**07**
	(b)	Explain different types of failure of gear teeth.	**07**

OR

Q.4	**(a)**	Write the expressions for the static strength, limiting wear load and dynamic load for helical gears and explain the various terms used there in.	**07**
	(b)	A bronze spur pinion rotating at 600 r.p.m. drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. The face width of both the gear is 90 mm. Find the power that can be transmitted from the standpoint of strength.	**07**
Q.5	**(a)**	Derive the expression to determine wrench torque required for bolt tightening.	**07**
	(b)	Derive an expression of length of cross belt drive	**07**

OR

Q.5	**(a)**	What do you understand by a column and strut? Explain the various end conditions of a column or strut.	**07**
	(b)	Describe with the help of a neat sketch the principal of operation of an internal expanding shoe brake.	**07**

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