

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2162001

Date:21/05/2019

Subject Name:Design of Mechanisms - I

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.

		MARKS
Q.1	(a) Mention the applications of various types of springs.	03
	(b) What is mechanical advantage? Explain it in context of various types of levers.	04
	(c) State the Euler's formula. What are the assumptions used to derive this formula? Mention the limitations of Euler's formula.	07
Q.2	(a) Write a short note on Standardization.	03
	(b) What is stress concentration? Suggest various remedies of it.	04
	(c) Write a short note on Factor of safety and Preferred numbers.	07
	OR	
	(c) Design a helical compression spring for a maximum load of 1500 N for a deflection of 25 mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420 MPa and modulus of rigidity is 84 kN/mm ² .	07
Q.3	(a) What is bearing pressure? Explain it with at least one engineering application of the same.	03
	(b) A seamless spherical shell, 950 mm in diameter and 10 mm thick is being filled with a fluid under pressure until its volume increases by 120 X 10 ³ mm ³ . Calculate the pressure exerted by the fluid on the shell, taking modulus of elasticity for the material of the shell as 200 KN/mm ² and Poisson's ratio as 0.3.	04
	(c) Efficiency of self locking screw is less than 50%, why?	07
	OR	
Q.3	(a) Explain the bolts of uniform strength. Explain methodologies to obtain the uniform strength.	03
	(b) Explain the force analysis for toggle type of screw jack.	04
	(c) Derive the expression for torque required to raise the load in context of power screw.	07
Q.4	(a) Explain the use of key. Mention various failures of it.	03
	(b) Explain the procedure to design a cotter in cotter joint during bending failure.	04
	(c) The shaft running at 180 rpm transmit 300 KW Power. The working condition to be satisfy by the shaft are	07
	(i) The shear stress must not exceed 55 MPa	
	(ii) The angle of twist must not be more than 2° on a length of 16d	
	Calculate the diameter of shaft. Take G= 0.85x10 ⁵ MPa	

OR

- Q.4** (a) Differentiate between shaft and Axle. **03**
(b) How to design a frame of Hacksaw blade? Explain with steps. **04**
(c) Explain at least three cases which uses bolted joint with rough sketches. Analyze any one case. **07**
- Q.5** (a) Explain the concept of combine loading by considering a suitable engineering application. **03**
(b) What is shear? Explain various types of it. **04**
(c) Explain the steps of designing knuckle joint. Draw various resisting area during design steps. **07**

OR

- Q.5** (a) What is thin cylinder? Mention its typical uses in engineering field. **03**
(b) Why Rankine's formula is adopted for all kind of columns? **04**
(c) Explain the design procedure for designing the lever of a lever loaded safety valve. **07**

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