

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

**Subject Code: 2130103**

**Date: 28/11/2019**

**Subject Name: Analysis Of Mechanisms & Machine Elements**

**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.

|            |                                                                                                                                                                                                                                                                                   | MARKS |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Q.1</b> | (a) Define: (i) Linkage (ii) DOF (iii) Mechanism                                                                                                                                                                                                                                  | 03    |
|            | (b) List different types of kinematic pairs with neat sketch.                                                                                                                                                                                                                     | 04    |
|            | (c) With help of neat sketches explain inversions of four-bar chain mechanism.                                                                                                                                                                                                    | 07    |
| <b>Q.2</b> | (a) Define Coriolis components of acceleration. When it occurs?                                                                                                                                                                                                                   | 03    |
|            | (b) With help of sketch explain Kennedy's theorem.                                                                                                                                                                                                                                | 04    |
|            | (c) Explain Stress-Strain relationship for ductile materials.                                                                                                                                                                                                                     | 07    |
|            | <b>OR</b>                                                                                                                                                                                                                                                                         |       |
|            | (c) Explain Whitworth quick return mechanism with the help of neat sketch.                                                                                                                                                                                                        | 07    |
| <b>Q.3</b> | (a) What information do you get by Velocity & Acceleration diagrams?                                                                                                                                                                                                              | 03    |
|            | (b) What is D'Alembert's principle? Explain it in detail.                                                                                                                                                                                                                         | 04    |
|            | (c) Briefly explain Klein's construction.                                                                                                                                                                                                                                         | 07    |
|            | <b>OR</b>                                                                                                                                                                                                                                                                         |       |
| <b>Q.3</b> | (a) Define: (i) Poisson ratio (ii) Crushing stress (iii) Impact stress                                                                                                                                                                                                            | 03    |
|            | (b) What is superposition principle theorem for static force analysis ?                                                                                                                                                                                                           | 04    |
|            | (c) A solid circular shaft is subjected to a bending moment of 3000 N-m and a torque of 10000 N-m. The shaft is made of 45 C 8 steel having ultimate tensile stress of 700 MPa and a ultimate shear stress of 500 MPa. Factor of safety = 6, determine the diameter of the shaft. | 07    |
| <b>Q.4</b> | (a) Define: (i) Spindle (ii) Axle (iii) Shaft                                                                                                                                                                                                                                     | 03    |
|            | (b) Enlist physical properties of material and explain any two in detail.                                                                                                                                                                                                         | 04    |
|            | (c) Explain caulking and fullering with neat sketch.                                                                                                                                                                                                                              | 07    |
|            | <b>OR</b>                                                                                                                                                                                                                                                                         |       |
| <b>Q.4</b> | (a) Define: (i) Factor of safety (ii) Volumetric strain (iii) Lateral strain                                                                                                                                                                                                      | 03    |
|            | (b) What is principle of virtual work? Explain it in detail.                                                                                                                                                                                                                      | 04    |
|            | (c) Derive an expression for the inertia force due to reciprocating mass in reciprocating engine, neglecting mass of the connecting rod.                                                                                                                                          | 07    |
| <b>Q.5</b> | (a) What is the Strength and Efficiency of the riveted joint?                                                                                                                                                                                                                     | 03    |
|            | (b) Briefly explain Electric arc welding.                                                                                                                                                                                                                                         | 04    |
|            | (c) Classify Butt joint & Lap joint with sketch.                                                                                                                                                                                                                                  | 07    |
|            | <b>OR</b>                                                                                                                                                                                                                                                                         |       |
| <b>Q.5</b> | (a) Define: (i) Margin (ii) Back pitch (iii) Diagonal pitch                                                                                                                                                                                                                       | 03    |
|            | (b) Write difference between Welded joints and Riveted joints.                                                                                                                                                                                                                    | 04    |
|            | (c) Classify Pressure vessels. Derive equation for Thin cylindrical shell subjected to an internal pressure.                                                                                                                                                                      | 07    |

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