

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:3160308****Date:12-07-2023****Subject Name:Biomechanics****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) Explain briefly moment of inertia. **03**
- (b) Describe the principle of capillary viscometer. Explain the Poiseuille's equation for calculating viscosity. **04**
- (c) Write in detail the biomechanics of spinal column. **07**
- Q.2** (a) Describe Newton's Laws of Motion. **03**
- (b) Define: 1) Coplanar Forces 2) Noncoplanar Forces **04**  
3) Concurrent Forces 4) Nonconcurrent Forces
- (c) Explain mechanical properties of hard tissue. **07**
- OR**
- (c) Draw and explain the types of joints in human body. **07**
- Q.3** (a) Explain biocompatibility of orthopedic implants. **03**
- (b) Define viscosity and viscometer. **04**
- (c) List and explain the rheological properties of blood. **07**
- OR**
- Q.3** (a) Enlist the characteristics of mechanical heart valves. **03**
- (b) Explain solid and fluid frictional force. **04**
- (c) Describe biomechanics of heart valves with necessary derivations. **07**
- Q.4** (a) How a prosthetic valve is tested? **03**
- (b) Elaborate Kelvin-Voight model of soft tissue. **04**
- (c) Explain the design aspects of orthopedic implant. **07**

**OR**

- Q.4** (a) Explain different types of heart valves and their functions in our body. **03**
- (b) Describe structural difference between ligaments and tendons with figure. **04**
- (c) Explain in detail Hill's muscle model. **07**
- Q.5** (a) Describe Bernoulli's principle. **03**
- (b) Explain manufacturing process of implants. **04**
- (c) Describe the structure and composition of bone. **07**
- OR**
- Q.5** (a) Explain Hagen-poiseuille equation. **03**
- (b) Describe briefly mechanics of blood vessels. **04**
- (c) Write in detail the applications of gait and locomotion analysis. **07**

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