Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:3160308 Date:02/12/2021

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)**	Describe Newton's Laws of Motion.	**03**
	(b)	Define: 1) Coplanar Forces 2)Collinear Forces 3)Concurrent Forces 4) Parallel Force	**04**
	(c)	What are various types of upper and lower limb joints in human body? Explain the movements provided by each joint.	**07**
Q.2	**(a)**	Explain briefly scalar and vector mechanics.	**03**
	(b)	Explain the principle of capillary viscometer. Explain the Poiseuille's equation for calculating viscosity.	**04**
	(c)	Explain mechanical properties of hard tissue.	**07**
		OR	
	(c)	Explain in detail biomechanics of spinal column.	**07**
Q.3	**(a)**	Define moment of inertia.	**03**
	(b)	Discuss biocompatibility of orthopedic implants.	**04**
	(c)	Explain biomechanics of heart valves with necessary derivations.	**07**
		OR	
Q.3	**(a)**	Explain solid and fluid frictional force.	**03**
	(b)	Enlist the differences between biological and mechanical heart valves.	**04**
	(c)	List and explain the rheological properties of blood.	**07**
Q.4	**(a)**	Enlist and explain different types of heart valves and their functions in our body.	**03**
	(b)	Elaborate Kelvin-Voight model of soft tissue.	**04**
	(c)	Explain in detail Hill's muscle model.	**07**
		OR	
Q.4	**(a)**	How a prosthetic valve is tested?	**03**

	(b)	Explain structural difference between ligaments and tendons with figure.	**04**
	(c)	Write down specifications for a prosthetic joint.	**07**
Q.5	**(a)**	Explain Hagen-poiseuille equation.	**03**
	(b)	Explain manufacturing process of implants.	**04**
	(c)	Explain the applications of gait and locomotion analysis.	**07**

OR

Q.5	**(a)**	Describe Bernoulli's principle.	**03**
	(b)	Explain briefly mechanics of blood vessels.	**04**
	(c)	Describe the structure and composition of bone.	**07**

****