Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160308 Date:22-05-2024

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)**	What is Newton's Laws of Motion?	**03**
	(b)	Define moment of inertia with example.	**04**
	(c)	Draw the structure of knee joint and explain the forces acting on it.	**07**
Q.2	**(a)**	What is Poiseuille's equation? Describe the applications of it.	**03**
	(b)	Write in detail: 1) Coplanar Forces 2) Noncoplanar Forces	**04**
	(c)	Explain in detail the biomechanics of shoulder.	**07**
		OR	
	(c)	Write a short note on structure and function of soft tissues.	**07**
Q.3	**(a)**	Describe solid and fluid frictional force.	**03**
	(b)	What is cartilage in joints? Explain different types of it.	**04**
	(c)	Write a detail note on design aspects of orthopedic implant.	**07**
		OR	
Q.3	**(a)**	Enlist the characteristics of biological heart valves.	**03**
	(b)	Elaborate Kelvin-Voight model of soft tissue.	**04**
	(c)	What is blood? List and explain the rheological properties of blood.	**07**
Q.4	**(a)**	Explain the viscosity.	**03**
	(b)	Write a note on mechanics of blood vessels.	**04**
	(c)	Explain in detail the biomechanics of gait and gait analysis.	**07**
		OR	
Q.4	**(a)**	What is Bernoulli's principle? Explain it with example.	**03**
	(b)	Explain the structural difference between ligaments and tendons with figure.	**04**
	(c)	Draw and explain the structure and composition of bone.	**07**

Q.5	**(a)**	What is Hagen-poiseuille equation?	**03**
	(b)	Describe the manufacturing process of implants.	**04**
	(c)	What is Hill's muscle model? Explain it for muscle force-length relationship.	**07**

OR

Q.5	**(a)**	Describe different types of heart valves and their functions in our body.	**03**
	(b)	Write a note on biocompatibility of orthopedic implants.	**04**
	(c)	Draw and explain biomechanics of heart valves with necessary derivations.	**07**

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