

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2160308
Date: 18/05/2019
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.

		MARKS
Q.1	(a) Explain the term 'Free body diagram'.	03
	(b) Define the following set of forces: concurrent, non-concurrent, coplanar, non-coplanar.	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 the principle of capillary viscometer. Explain the Poiseuille's equation for calculating viscosity.	03
	(b) Briefly describe Newton's Law of motion.	04
	(c) Explain in detail biomechanics of spinal column.	07
	OR	
	(c) The golfer's hand move through an arc length of 10 cm during a putt. What arc length does the head of the putter move through if the hands are 50cm from the axis of rotation and the putter head is 150cm from the axis of rotation?	07
Q.3	(a) What is biocompatibility?	03
	(b) Which are the factors that affect force and torque developed by muscle?	04
	(c) Write down specifications for a prosthetic joints.	07
	OR	
Q.3	(a) Define moment of inertia.	03
	(b) Explain briefly mechanics of blood vessels.	04
	(c) Describe lung ventilation model.	07
Q.4	(a) Enlist and explain different types of heart valves and their functions in our body.	03
	(b) Explain the material properties of cartilage and ligaments.	04
	(c) Explain in detail Hill's muscle model.	07
	OR	
Q.4	(a) Elaborate Kelvin-Voight model of soft tissue.	03
	(b) What are rheological properties of blood?	04
	(c) Describe the structure and composition of bone.	07
Q.5	(a) How a prosthetic valve is tested?	03
	(b) Person A is pushing a door with a horizontal force of 200N. The moment of arm of this force around the hinges of the door is 60cm. Person B is pushing in the opposite direction on the other side of the door. The moment arm of his pushing force is 40cm. How large is the force that Person B pushes with if the door is in static equilibrium?	04
	(c) What is spirometry? Explain in detail.	07
Q.5	(a) Describe the respiratory cycle.	03
	(b) Explain manufacturing process of implants.	04
	(c) Write a note on Biomechanics of Gait.	07
