GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2020

Subject Code: 2160308   Date: 29/01/2021
Subject Name: Biomechanics
Time: 02:00 PM TO 04:00 PM   Total Marks: 56

Instructions:
1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			MARKS
Q.1	(a)	Enlist at least 3 examples of scalar and vector quantities each	03
	(b)	Find resultant force for concurrent force system where $F_1=150N$ and $F_2=100N$. Angle made with Positive X-Axis by these two forces are 30° and 135° respectively. Write the Resultant force in terms of its components.	04
	(c)	Explain classes of lever in detail with example.	07
Q.2	(a)	Draw a free body diagram for a forearm with weight of 20N which is loaded by a weight of 100N at palm, where CG of the forearm is at 20cm and weight is at 50cm from elbow for following two conditions: 1) Forearm is in horizontal position. 2) Forearm is at 60° downward position from horizontal.	03
	(b)	Explain capillary viscometer in brief.	04
	(c)	Explain Spirometry in detail.	07
Q.3	(a)	Define following terms: (1) Dorsiflexion, (2) Circumduction, (3) Anterior	03
	(b)	Draw a chart for skeletal joint and its classification.	04
	(c)	A horizontal stick is applied with 100N upward force at one end. If the length of the stick is 100cm and the fixed reference point 'O' is at the middle, then design a force system which will generate same amount of moment at reference point (M_O) with two forces applied at both ends of the stick.	07
Q.4	(a)	Explain Kelvin-Voight model of viscoelasticity.	03
	(b)	Explain Hinge joint in detail.	04
	(c)	For a person wearing weight boot in a seating position and doing lower leg flexion/extension exercise: consider weight of lower leg is 50N and weight of boot is 150N. From knee joint CG of lower led is at 25cm and weight boot is at 55 CM. Find moment at knee joint when lower leg is (1) Extended horizontally, (2) at 45° and (3) at 90°.	07
Q.5	(a)	Explain Laminar Flow.	03
	(b)	Compare following mechanical heart valves: Bi-leaflet & Tilting Disc	04
	(c)	Explain Hill's muscle model.	07
Q.6	(a)	Explain Turbulent Flow.	03
	(b)	What are soft and hard tissues? List types of both.	04

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(c) Explain working of Ball and Cage MHV during one cardiac **07**
cycle.

Q.7	**(a)**	Explain role of biomechanics in design of orthopedic implant.	**03**
	(b)	Explain rod type fracture fixation.	**04**
	(c)	Explain characteristics of metals as biomaterial.	**07**

Q.8	**(a)**	Define Biocompatibility and explain its importance.	**03**
	(b)	Explain artificial Hip joint and discuss its specifications.	**04**
	(c)	Explain human gait cycle in detail.	**07**

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