Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2733104 **Date:03/05/2016**

Subject Name: Biodynamics

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.**

Q.1	**(a)**	Describe various notation for human movement. Explain three primary planes of a standing person.	**07**
	(b)	Explain the properties of bones, cartilages and ligaments with their applications in human dynamics.	**07**
Q.2	**(a)**	Describe the synarthrosis, amphiarthrosis and diarthrosis in detail.	**07**
	(b)	Explain the center of mass and its motions related to human body with necessary examples.	**07**
		OR	
	(b)	Describe the principal of conservation of angular momentum with necessary examples.	**07**
Q.3	**(a)**	Determine the reaction forces exerted on the feet and the hands during push-ups with appropriate schematics.	**07**
	(b)	Define static equilibrium. Classify static equilibrium of various objects with appropriate sketches.	**07**
		OR	
Q.3	**(a)**	Explain the physical properties of skeletal muscle with types of muscle organizations in human body.	**07**
	(b)	Explain a muscle fiber under tension with necessary graphs.	**07**
Q.4	**(a)**	Explain the effect of eccentric loading on the relative motion of two rigid members articulating at a ball-and-socket joint.	**07**
	(b)	Define angular velocity. Explain its applications in vertical jumping with a schematic diagram.	**07**
		OR	
Q.4	**(a)**	Describe the involvement of multiple muscles in flexion of elbow with necessary sketches.	**07**
	(b)	Define angular acceleration. Explain its applications in vertical jumping with a schematic diagram.	**07**
Q.5	**(a)**	Describe the limb-lengthening procedure as applied to the leg of a man with necessary schematic drawings.	**07**
	(b)	Consider an athlete who is pushing against a wall to stretch his Achilles tendons during a warm-up before an athletic event. Assume mass, height and other necessary properties of the athlete. Determine the forces exerted on the athlete by the wall and the ground as a function of the angle of inclination θ.	**07**
		OR	
Q.5	**(a)**	While standing straight a man begins swinging his arms at constant frequency. Compute the moment of momentum about the center of mass of the man in the standard standing configuration.	**07**

(b) A woman with a knee injury is using crutches for walking and standing. Determine the contact forces acting on the crutches and on her foot at the standing configuration. **07**

****