Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University, Manipal – 576 104

4th SEMESTER B.Tech. (BME) DEGREE MAKE-UP EXAMINATIONS, JUNE/JULY 2016

SUBJECT: BIOMECHANICS (BME 332)
(REVISED CREDIT SYSTEM)
Saturday, July 9th, 2016 : 2.00 pm - 5.00 pm

TIME: 3 HOURS **ANSWER ANY FIVE FULL QUESTIONS** **MAX. MARKS: 50**

1. (a) Explain any four movements that are perpendicular to Sagittal axis. (4)

   (b) Describe the effects of drag force in case of a golf ball. (4)

   (c) Draw the trajectory of a discus showing the angle of attack, angle of projection and angle of attitude at release, peak and descent. (2)

2. (a) Define the spatial parameters of a gait cycle. (4)

   (b) With appropriate examples, write briefly about muscle rate coding. (4)

   (c) How much force must be produced by the biceps brachii at a perpendicular distance of 3 cm from the axis of rotation at the elbow to support a weight of 200 N at a perpendicular distance of 25 cm from the elbow? (2)

3. (a) Illustrate to show how a projectile can generate magnus force in the leftward direction. Also draw the trajectory of the projectile and explain it in detail. (4)

   (b) Write the functions performed by a muscle. (4)

   (c) What is the resulting angular acceleration of 1.7 kg forearm & hand when the forearm flexors, attaching 3 cm from the center of rotation at the elbow, produce 10 N of tension, given a 90^o angle at the elbow and a forearm & hand with a radius of gyration of 20 cm? (2)

4. (a) Explain about the biomechanical principles: force-motion and force-time. (4)

   (b) How do you perform PNF method for Hamstrings muscle? (4)

(c) How much force must be produced by the fibers of a pennate muscle aligned at a 60^o angle to a central tendon to create a tensile force of 200 N in the tendon? What must be the effective minimal cross-sectional area of the muscle? (2)

5. (a) Write about repetitive vs. acute loads on human body. (4)

(b) If the location of hip, knee & ankle joints are (1.14, 0.80), (1.22, 0.51) and (1.09, 0.09) respectively, calculate the angles of thigh & leg segments and also the angle of knee joint. (4)

(c) How do the slow twitch and fast twitch muscle fibers handle a prestretch? (2)

6. (a) Explain how the frequency of stimulation plays a major role in generating muscle tension. (4)

(b) Provide two appropriate examples to justify that certain bones in the human body are designed to resist fracture. (4)

(c) A 7.27 kg hammer on a 1 m wire is released with a linear velocity of 28 m/s. What reaction force is exerted on the thrower by the hammer at the instant before release? (2)