MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

IV SEMESTER B.Tech. DEGREE MAKE-UP EXAMINATIONS JUNE 2017
SUBJECT: BIO-MECHANICS (BME 3282)
(Open Elective)
(REVISED CREDIT SYSTEM)
Friday, 23rd June 2017: 2PM to 5 PM

TIME: 3 HOURS   **MAX. MARKS: 50**

Instructions to Candidates:
1. **Answer all the questions.**
2. **Draw labeled diagram wherever necessary.**

1A.	Define all the human segmental movements possible in the sagittal plane.	**6**
1B.	Explain about the bone failure mechanics and also write about the types of bone fracture.	**4**
2A.	Explain how the muscle fibers are recruited (i.e) order of muscle fiber activation and deactivation?	**6**
2B.	With an example each, define active and passive insufficiency.	**4**
3A.	How do you measure the vertical ground reaction force using a force platform?	**6**
3B.	Considering the Young's moduli for long bone to be 30,000, what strain energy is required to deform the bone to a strain of 0.1%? How much strain energy is stored in the bone if it is exposed to a stress of 30 MPa?	**4**
4A.	Explain in detail about the floating position of human body.	**6**
4B.	A forearm weighing 35 N is held at an angle of 45° to the vertically oriented humerus bone. The center of gravity of the forearm is located at a distance of 15 cm from the center of the the elbow joint. The elbow-flexor muscles are attached at an average distance of 3 cm from the center of the elbow joint. Calculate the force to be exerted by the elbow-flexors, to maintain the same position. Calculate the force to be exerted by the elbow-flexors, if a weight of 50 N is held in the hand, at a distance of 25 cm from the center of the elbow joint. Draw the free body diagram.	**4**
5A.	Illustrate to show how lift force is generated in a bottom spinning ball and also explain its trajectory.	**6**
5B.	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**