Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
(A constituent unit of MAHE, Manipal 576104)

IV SEMESTER B.Tech. DEGREE MAKE UP EXAMINATIONS JUNE 2019
SUBJECT: BIOMECHANICS (BME 3282)
Open Elective I
(REVISED CREDIT SYSTEM)
Friday, 21st June 2019: 2 PM to 5 PM

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

Instructions to Candidates:

1. **Answer all the questions.**
2. **Draw labeled diagrams wherever necessary.**

1.	(a)	Explain all the movements possible at the hip joint.	05
	(b)	Differentiate parallel muscle fiber arrangement from penniform muscle fiber arrangement.	05
2.	(a)	Explain in detail about the skeletal muscle tissue properties.	05
	(b)	With an example, briefly explain about force couple.	05
3.	(a)	Explain the timing parameters of gait.	05
	(b)	Write the formulae to calculate the lower extremity joint angles? Also mention the joint angles in the case of walking and running.	05
4.	(a)	Calculate the center of mass of the thigh segment, if the center of mass is 42.8% of the length of the thigh measured from proximal end along the long axis of the segment. The location of hip and knee joints are (846.6 mm, 833.2 mm) and (861.4 mm, 464.3 mm) respectively.	04
	(b)	A runner weighing 52 kg is running forward at 5 m/s when his foot strikes the ground. The vertical ground reaction force acting under his foot at this instant is 1800 N. The friction force acting under his foot is a 300 N braking force. These are the only external forces acting on the runner other than the gravitational force. What is the runner's vertical acceleration, as a result of these forces?	03
	(c)	Calculate the height of the center of mass above its starting height during a squat jump based on the following information: body weight = 670 N, total vertical force = 788 N and the time of force application = 0.9 sec.	03
5.	(a)	How is lift force generated in case of air-foil or wing-shaped objects?	05
	(b)	If a person has to float naturally or conditionally, what are the characteristics that are required to float efficiently in both the cases mentioned above.	05