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MANIPAL INSTITUTE OF TECHNOLOGY Manipal University, Manipal – 576 104



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

SUBJECT: BIOMECHANICS (BME 3282) (REVISED CREDIT SYSTEM) Saturday, July 9th, 2016 : 2.00 pm - 5.00 pm

TIME: 3 HOURS ANSWER ALL THE 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 (2) angle of attitude at release, peak and descent.

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
 (2) 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?
- 3. (a) Illustrate to show how a projectile can generate magnus force in the leftward (4) direction. Also draw the trajectory of the projectile and explain it in detail.

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

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

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° 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)