Question Paper

Exam Date & Time: 07-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

IV Semester B.Tech (Biomedical) End Semester Examination May 2024

BIOMECHANICS [BME 2223]

Marks: 50 **Duration: 180 mins.**

Descriptive Questions

Answer all the questions. Section Duration: 180 mins

1. Answer All Questions.
2. Draw labelled diagram whereever necessary

1)		In human body, considering the composition of blood, Justify why blood is a Non-Newtonian fluid.	(3)
	A)		
	B)	Analyse the nature of Sputum and Cervical Mucus, considering the features of Viscoelastic fluids.	(4)
	C)	Estimate the wall shear stress of the blood vessel wall, if the diameter of blood vessel and mean velocity of blood flow are 80 µm and 30 mm/sec respectively.	(3)
2)		Blood vessels wall materials play a major role in determining the mechanical properties of a blood vessel, Justify this with relevant explanation.	(3)
	A)		
	B)	Illustrate the major categories of Mechanical prosthetic heart valves with diagram only: a. Caged ball b. Caged disk c. Tilting disk d. Bileaflet pivoting disk	(4)
	C)	During inspiration, forces on the airway tend to open and during expiration forces tend to close the airways, in detail analyse the airway resistance.	(3)
3)		Interpret the muscle frequency coding and analyse how dose the motor units respond when they are activated in case of sub maximal and maximal muscle contraction.	(4)
	A)		
	B)	A person is holding a dumbbell and the arm whose length is 50 cm is flexed to 60^0 (degree) from the reference position. Estimate the length of moment arm between the dumbbell and the shoulder joint? Also, draw the free body diagram.	(3)
	C)	Illustrate with the help of neat diagram, the cross section of the middle section of ligament and its structure.	(3)
4)		Bone is an anisotropic material and its mechanical behaviour depends upon the direction of loading. Provide an Inference on it.	(3)

	A)		
	B)	Analyse the stress-strain diagram of trabecular bone and explain it in detail.	(3)
	C)	Categorize the temporal parameters of a gait cycle and draw the relevant diagram for each stage.	(4)
5)		Illustrate atleast 3 specific examples to explain the significance of kinetic analysis in human movement.	(3)
	A)		
	B)	Identify the two factors that distinguishes walking from a running gait? Represent the variations that occur in kinematic parameters during different phases in a gait cycle of a runner.	(3)
	C)	A javelin leaves the thrower's hand at 15 m/s at angle of 42 degree and a height of 1.3m. a) Estimate the javelins' flight time? b) Estimate the javelins' maximum height? c)How far will the javelin travel from the thrower's hand before it lands?	(4)

-----End-----