RollNo. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, April/May 2025

Biomedical Engineering
7th Semester
BM5701 BIOMECHANICS
(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	Understand the use of mechanics in medicine.
CO2	Understand the mechanics of physiological systems.
CO3	Distinguish the reason for abnormal patterns
CO4	Analyze the biomechanical systems using mathematical models.
CO5	Design and develop the models specific to orthopedic applications.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No	Questions	Marks	CO	BL
1	What is Biomechanics?	2	1	1
2	Give examples for Newtonian fluids.	2	1	1
3	Why the shear stress in the extra corporeal device should be analyzed?	2	2	2
4	Give the drawback of biological heart valves.	2	2	1
5	Mention few immovable joints.	2	3	1
6	Enumerate the types of lubricants.	2	3	1
7	How the in-vivo elasticity of blood vessel can be measured?	2	4	2
8	List the significance of mathematical model	2	4	2
9	Define Gait cycle.	2	5	1
10	What is the need of vehicular vibration test.	2	5	2

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No	Questions	Marks	CO	BL
11 (a) (i)	Explain the composition, types and mechanical properties of bone	9	1	2
(ii)	Brief about Anthropometry.	4	1	2
	OR			
11 (b) (i)	Discuss the scope of mechanics in medicine.	9	1	2
(ii)	Give the relationship between stress, strain ,elastic modulus and Poisson's ratio.	4	1	2

12 (a) (i)	Derive the necessary equation to prove the velocity profile of blood is parabola	**9**	2	2
(ii)	How the power developed by the heart can be measured?	**4**	2	2
	OR			
12 (b)	Discuss the different types and working of prosthetic heart valves	**13**	2	2
13 (a)	Explain the mechanical properties of articular cartilage and discuss its diffusion property	**13**	3	2
	OR			
13 (b) (i)	Explain the different types of synovial joints	**8**	3	2
(ii)	Discuss about synovial fluid	**5**	3	2
14 (a)	What is pulse wave velocity? Derive the necessary equation to calculate the pulse wave velocity	**13**	4	2
	OR			
14 (b)	Explain the need and advantages of finite element analysis with suitable example.	**13**	4	2
15 (a)	Describe the gait analysis procedure and its applications	**13**	5	2
	OR			
15 (b)	Discuss about the mechanics of knee joint	**13**	5	2

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No	Questions	Marks	CO	BL
16. (i)	Explain the rheology concept of blood and mention when the blood said to be Newtonian	**10**	2	3
(ii)	During tensile test, a human bone specimen of length 9.5mm and gage cross section of (3.65x2) mm is observed at a point of 350KN. The measured elongation was 0.05mm in gage length. The dimension of the width is observed to have decreased by 0.0069mm. Calculate the Poisson's ratio and elastic modulus	**5**	1	3