PRACTICE SET

End Semester Examination, Dec 2025

Program: BPT

Semester: III

Subject: Biomechanics-I

Subject Code: 23A302

COURSE OUTCOME	Description
CO1	Explain the fundamental principles of mechanics.
CO2	Describe the structural and functional properties of human joint and muscles and their response to injuries & diseases.
CO3	Apply mechanical principles to analyze human movement, joint function and muscle action
CO4	Establish factors influencing posture & postural imbalance in static and dynamic position

Section A **(20 X 5= 100)**

1. Define Kinematics and explain the various types of displacement. [CO1](Unit 1) (Understand LOT)
2. State Newton's three laws of motion. [CO1] (Unit 1) (Apply LOT)
3. Define center of gravity and explain its role in body stability. [CO1](Unit 1) (Understand LOT)
4. Describe the types of levers found in the human body and explain their significance. [CO1](Unit 1) (Understand LOT)
5. Define torque and explain its physiological relevance in joint movement. [CO1] (Unit 1) (Understand LOT)
6. State the principles of equilibrium and stability. [CO1](Unit 1) (Remember LOT)

7. Write a short note on the various types of muscle fibers. [CO2](Unit 3) (Remember LOT)
8. Explain the calculation of resultant force in a concurrent force system.[CO1] (Unit 1) (Remember LOT)
9. Explain the biomechanical application of anatomical pulley.[CO3] (Unit 3) (Understand LOT)
10. Briefly describe the concept of kinematic chain in human joints. [CO3] (Unit 2) (Understand LOT)
11. Explain linear force system and its prerequisites. [CO1] (Unit 1) (Remember LOT)
12. Write a short note on types of muscle contractions. [CO2] (Unit 3)(Understand LOT)
13. Describe how the quadriceps and hamstrings work together to maintain stability at the knee joint during squatting.[CO3] (Unit 3)(Apply LOT)
14. Define posture and identify the factors influencing it.[CO4] (Unit 4)(Remember LOT)
15. Write a short note on the effect of immobilization on bone.[CO2](Unit 2)(Understand LOT)
16. Write a short note on active insufficiency. [CO3] (Unit 3) (Understand LOT)
17. Explain stress relaxation and stress-strain sensitivity. [CO3] (Unit 3) (Understand LOT)
18. Explain the role of the moment arm in determining muscular efficiency. [CO1] (Unit 1) (Understand LOT)
19. State the difference between static and dynamic posture.[CO4] (Unit 4) (Remember LOT)
20. List the factors leading to postural imbalance in daily activities. [CO4] (Unit 4) (Understand LOT)

Section B **(15 X 10= 150)**

21. Explain Newton's laws of motion and apply them to human movement analysis. [CO3] (Unit 1) (Apply LOT)
22. Explain the concept of resistance exercises with respect to torque. [CO1] (Unit 1) (Apply LOT)
23. Describe in detail the structure and functions of various tissues present in joints. [CO2] (Unit 2) (Understand LOT)
24. Analyse the various grades of ligament injury in correlation with stress-strain curve. [CO3] (Unit 2) (Analyse HOT)
25. Explain the concept of levers and their mechanical advantage in human musculoskeletal structure. [CO2] (Unit 1) (Apply LOT)
26. Discuss the role of torque and moment arm in producing motion at different joints. [CO1] (Unit 1) (Apply LOT)
27. Explain how muscle length and tension relationship affects the efficiency of contraction.[CO2] (Unit 3) (Understand LOT)
28. Explain the concept of various force and force system action on an individual's leg when sitting in a high sitting position with the help of a diagram.)[CO3] (Unit 1) (Apply LOT)

29. Discuss the classification of muscles based on their structure and function.[CO2] (Unit 3) (Understand LOT)
30. Evaluate the effect of prolonged standing or sitting on cartilage with respect to its structural and functional property. [CO2] (Unit 2) (Evaluate HOT)
31. Discuss the mechanical and structural properties that make joints stable and mobile. [CO2] (Unit 2) (Apply LOT)
32. Explain the biomechanical factors responsible for maintaining equilibrium in standing posture. [CO4] (Unit 4) (Apply LOT)
33. Discuss the role of ergonomics in preventing postural imbalance. [CO4] (Unit 4) (Apply LOT)
34. Analyse how gravitational forces influence body stability and posture in different positions. [CO4] (Unit 4) (Analyse HOT)
35. Explain the classification of joints in detail. [CO2] (Unit 2) (Remember LOT)

Section C **(10 X 20= 200)**

36. Evaluate how mechanical principles such as force, stability, and equilibrium contribute to efficient human movement. [CO3] (Unit 1) (Evaluate HOT)
37. Analyse the concept of torque and lever systems in biomechanics with detailed human examples. [CO3] (Unit 1) (AnalyseHOT)
38. Evaluate the structural and functional changes that occur in joint components following injury or disease, and their influence on movement. [CO2] (Unit 2) (Evaluate HOT)
39. Explain in detail about the kinematics and its variables with respect to joint movement. [CO3](Unit 1)(Analyse HOT)
40. Examine the relationship between joint design and functional freedom or restriction of movement.[CO3] (Unit 2) (Analyse HOT)
41. Analyse the factors affecting muscle tension and their impact on movement performance and recovery. [CO2] (Unit 3) (Analyse HOT)
42. Examine the biomechanical roles of major muscles and joints during walking, and outline how their co-ordinated function enables normal gait pattern.[CO3] (Unit 3) (Evaluate HOT)
43. Discuss the factors contributing to postural imbalance and evaluate corrective interventions. [CO4] (Unit 4) (Evaluate HOT)
44. Analyse the relationship between body alignment, gravity, and muscle force in upright posture. [CO4] (Unit 4) (Analyse HOT)
45. Evaluate how abnormal mechanics affect joint function, leading to musculoskeletal disorders. [CO3] (Unit 2) (Evaluate HOT)

Summary Sheet:

CO Wise

CO	Q.No.	Marks
CO1	1,2,3,4,5,6,8,11,18,22,26	65
CO2	7,12,15,23,25,27,29,30,31,35,38,41	125
CO3	9,10,13,16,17,21,24,28,36,37,39,40,42,45	175
CO4	14,19,20,32,33,34,43,44	85
Total		450

UNIT Wise

UNIT	Q.No.	Marks
1	1,2,3,4,5,6,8,11,18,21,22,25,26,28,36,37,39	155
2	10,15,23,24,30,31,35,38,40,45	120
3	7,9,12,13,16,17,27,29,41,42	90
4	14,19,20,32,33,34,43,44	85
Total		450

BLT Wise

BLT	Q. No.	Marks
LOT	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,25,26,27, 28,29,31,32,33,35	220
HOT	24,30,34,36,37,38,39,40,41,42,43,44,45	230
Total		450

Prepared by: Dr. Ragini Kumari (PT)

Disclaimer: - This is a Practice Set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.