

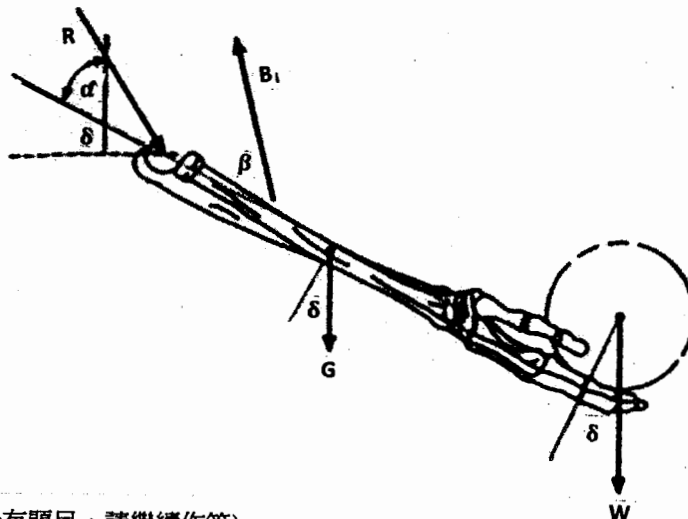
※ 考生請注意：本試題不可使用計算機

I. Define the following terms in words and/or figures

1. Young's modulus (3%)
2. Stress relaxation (3%)
3. Hysteresis (3%)
4. Viscoelasticity (3%)
5. Transverse isotropy (3%)
6. Tribology (3%)
7. Newtonian fluid (3%)
8. Inverse dynamics (3%)
9. Moment of inertia (3%)
10. Concentric muscle (3%)

II. Calculation and essay questions:

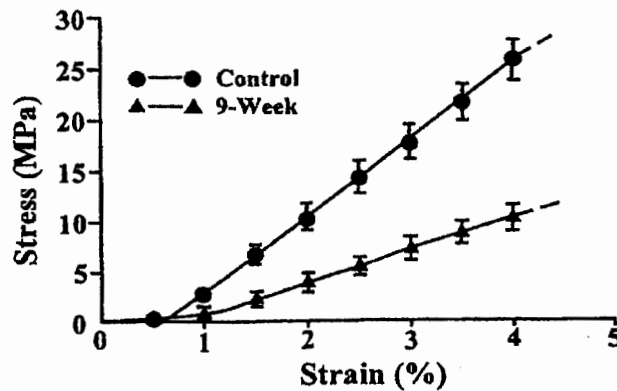
1. If a weight lifter has done 210.7J of work lifting a 50kg weight 0.43m from his shoulder in 0.7s, what was his power? (5%)
2. What is the magnitude of momentum of a cricket ball of mass 420g thrown at 20ms^{-1} ? (5%)
3. What are the main functions of ligament and tendon? (6%)
4. A therapist applies a lateral force of 80 N to the forearm at a distance of 25 cm from the elbow joint center. The biceps attaches to the radius at a 90° angle and at a distance of 3 cm from the elbow. (8%)
 - a. How much force is required of the biceps to stabilize the arm in position?
 - b. What is the magnitude of the reaction force exerted by the humerus on the ulna?
5. Use the following figure to write the equations of equilibrium in force and moments. (6%)



(後面仍有題目，請繼續作答)

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6. The next figure is the result of the mechanics properties of canine MCL from control (normal dog) and 9-week immobilization groups. Please write what phenomenon you can get from this result. (10%)



7. The table below shows the instantaneous velocity of a different bobsled during the first 10 seconds after the driver and crew had gotten on board. Plot a velocity vs Time graph from the data and answer the following questions: What was the sled's acceleration in the first 5 seconds? How far did the sled travel during those 5 seconds? What was the sled's average velocity during the first 5 seconds? Finally, describe what was happening to the bobsled's motion after 8 seconds. (10%)

TIME (s)	VELOCITY (m/s)
0	6.0
1	9.5
2	13.0
3	16.5
4	20.0
5	23.5
6	27.0
7	30.5
8	33.0
9	34.5
10	35.0

8. Describe the *structure and mechanical properties of arteries*, how artery wall mechanics are measured and modeled mathematically, and how they change along the arterial tree. Give two or more examples of how arteries change and remodel under conditions of disease or altered mechanical loading. (10%)
9. What information we usually get from clinical gait analysis? (10%)