

Code No: 07A51105

R07**Set No. 2**

III B.Tech I Semester Examinations, November 2010
BIOFLUIDS AND MECHANICS
Bio-Medical Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Write a short note on Alveolar Ventilation.
 (b) Explain why different parts of lungs have difference in ventilation and blood flow.
 (c) Write a short note on Ventilation-Perfusion Relationships. [5+6+5]
2. How do the elongated red blood cells affect the apparent viscosity of blood in narrow tubes? Explain in brief about distribution of suspended particles in narrow rigid tubes. [16]
3. (a) Draw and explain the stress-strain curve of a bone.
 (b) Explain briefly the structure of a diarthrodial joint. [8+8]
4. (a) Discuss about the blood composition.
 (b) Mention the factors on which the blood viscosity depends.
 (c) Explain the blood viscosity determination using a viscometer. [5+5+6]
5. (a) Write a short note on the structure of articular cartilage and meniscus.
 (b) Discuss the mechanical properties of Trabecular Bone Tissue. [8+8]
6. Define different types of flow. In a 5mm diameter vessel, what is the value of the flow rate that causes a wall shear stress of 0.84 N/m²? Would the corresponding flow be laminar or turbulent? [16]
7. (a) Differentiate between viscoelastic and elastic materials.
 (b) Explain and derive the expressions for stress-relaxation and creep of a Voigt model. [4+12]
8. (a) Correlate the materials and mechanical properties of blood vessels.
 (b) Discuss the flow behavior of blood as it flows through aorta to vena cava. [16]

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R07**Set No. 4**

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Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Enumerate any five cardiovascular diseases.
 (b) Draw and label the P-V curve of a lung.
 (c) With the help of P-V curve of lung explain the interaction between blood and lungs?
[5+5+6]
2. Define apparent viscosity of blood. Explain how Hematocrit value and tube diameter of blood vessels affect the viscosity of blood, with suitable curves. [16]
3. (a) Explain briefly the structure of a diarthrodial joint.
 (b) Explain briefly the functions of meniscus. [8+8]
4. (a) Write a short note on viscoelastic and elastic materials.
 (b) Draw Kelvin model and derive its basic governing equation. [8+8]
5. (a) What do you mean by soft tissue? What are the properties of normal skin?
 (b) Write a short note on the histology and mechanical properties of tendons and ligaments. [8+8]
6. (a) Derive the equation for the blood flow rate, assuming that blood Newton's law of viscosity.
 (b) Discuss the characteristics of Newtonian, non-Newtonian fluids [8+8]
7. (a) Explain in detail the qualitative requirements of prosthetic heart valves.
 (b) Define laminar and turbulent flow. What are the factors affecting the flow?
[8+8]
8. What is cell-free layer and how does it affect the hematocrit value in narrow tubes? Using relevant graphs explain Fahraeus effect. [8+8]

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R07**Set No. 1**

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BIOFLUIDS AND MECHANICS
Bio-Medical Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Write a short note on:
 - (a) Types of Flow .
 - (b) Reynolds number.
 - (c) Flow rate or discharge . [8+4+4]
2. What are the parameters that affect the viscosity of blood? Write a short note on yield stress of blood. [16]
3. What driving forces cause the opening and closing of heart valves? Describe the composition of a heart valve. Explain about the replacements of heart valves. [16]
4.
 - (a) Explain the normal breathing mechanism using P-V curve of a lung,
 - (b) Write a short note on Gas Exchange and Transport.
 - (c) Write a short note on Ventilation-Perfusion Relationships. [5+5+6]
5.
 - (a) Justify bone as a living organ.
 - (b) Describe various joints in human body and role of articular cartilage in smooth locomotion. [8+8]
6.
 - (a) Discuss about Cell-free layer and Plasma Skimming? How do they affect the apparent viscosity of blood in narrow tubes?
 - (b) Discuss about the inversion of the FAHRAEUS-LINDQUIST effect in very narrow tubes. [8+8]
7. What do you mean by soft tissue? Explain the terms viscoelasticity and pseudo-elasticity critically? Elaborate your answer how pseudo-elasticity and viscoelasticity influence the properties and functions of skin ligaments? [16]
8.
 - (a) Draw Voigt model and derive its basic governing equation.
 - (b) Explain the working principle of oscillating magnetic microrheometer. [8+8]

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R07**Set No. 3**

III B.Tech I Semester Examinations, November 2010
BIOFLUIDS AND MECHANICS
Bio-Medical Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Write a short note on:

- (a) Lung mechanical parameters.
- (b) Mechanics of Alveoli.
- (c) Ventilation-Perfusion relationships.

[6+5+5]

2. Why cell free layer exists at the wall of narrow blood vessels. What is meant by Plasma Skimming? Discuss about the hematocrit in very narrow tubes. [16]

3. Write a short note on :

- (a) Difference between ligament and tendon.
- (b) Anterior cruciate ligament.
- (c) Histology of tendon.

[5+5+6]

4. (a) Write a short note on Constitutive equation.

- (b) A 0.3m diameter pipe, conveying water, branches into two pipes of diameters 0.2m and 0.15m respectively. If the average velocity in 0.3m diameter pipe is 2.5m/s, find the discharge in this pipe. Also determine the velocity in 0.15m pipe if the average velocity in 0.2m diameter pipe is 2m/s.

[4+12]

5. (a) Draw a Kelvin model and derive its basic governing equation.

- (b) What are the uses of viscoelastic models?

[8+8]

6. (a) Briefly explain why is articular joint so efficient in lubrication?

- (b) Discuss about the structure and mechanical properties of bone with examples.

[8+8]

7. Write briefly about the proteins that are present in blood. How do they affect the blood viscosity? What is meant by yield stress of blood and what are the factors that are responsible for yield stress of blood? [16]

8. Write a short note on:

- (a) Resistance blood vessels.
- (b) Elastic blood vessels.
- (c) Distensibility and Compliance.

[5+5+6]
