

Code No: 07A51105

R07**Set No. 2**

III B.Tech I Semester Examinations, May 2011
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. Write a short note on:
 - (a) Hysteresis.
 - (b) Creep and stress- relaxation.
 - (c) Bio-viscoelastic fluids. [4+6+6]
3. (a) Discuss about Fahraeus effect and how does the apparent viscosity of blood changes with the size of the blood vessels.
- (b) Discuss about the motion of red blood cells in tightly fitted tubes. [8+8]
4. (a) Justify bone as a living organ.
- (b) Describe various joints in human body and role of articular cartilage in smooth locomotion. [8+8]
5. (a) Describe the mechanism involved in inspiration and expiration.
- (b) What is air-way resistance?
- (c) Justify the air-way resistance as a diagnostic parameter. [6+5+5]
6. (a) Explain the working of any prosthetic heart valve.
- (b) Describe the operation of any one mechanical heart valve.
- (c) Compare the performance features of mechanical and tissue heart valves. [6+5+5]
7. (a) Briefly explain composition and mechanical properties of collagen fibers.
- (b) Explain the role of tendons and ligaments in diarthrodial joints. [8+8]
8. (a) Describe the construction and working of a Couette viscometer.
- (b) List the advantages of a cone-plate viscometer. [8+8]

Code No: 07A51105

R07**Set No. 4**

III B.Tech I Semester Examinations, May 2011
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. (a) Write a short note on :
 i. Structure of collagenous tissue
 ii. Ligament in tension
 (b) Briefly explain composition and mechanical properties of collagen fibres. [4+4+8]
3. (a) Draw and explain the stress-strain diagram of a human cortical bone.
 (b) Discuss briefly on composition and structure of articular cartilage and meniscus. [8+8]
4. (a) What is the use of viscoelastic models?
 (b) Derive the equations for creep and stress relaxation for a Maxwell model. [4+12]
5. (a) Explain the effect of vessel diameter on blood viscosity?
 (b) On what factors does the blood viscosity depends? Explain them with necessary curves. [8+8]
6. Write a short on:
 (a) Role of capillaries in blood flow.
 (b) FAHRAEUS-LINDQUIST effect.
 (c) What is plasma skimming? Explain. [5+6+5]
7. (a) Explain the mechanical properties of arteries, arterioles and give their significance.
 (b) Compare the mechanical properties of the arteries and veins.
 (c) Write short notes on arteriosclerosis. [6+6+4]

Code No: 07A51105

R07

Set No. 4

8. Explain vascular tree with illustrations. Describe the relationship of diameter, velocity and pressure of blood in blood vessels. [16]

FIRSTRANKER

Code No: 07A51105

R07**Set No. 1**

III B.Tech I Semester Examinations, May 2011
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) Shear thinning and shear thickening fluids.
 - (b) Resistance to flow.
 - (c) Difference between Normal stress and Shear stress. [6+5+5]
2. (a) Describe the operation of mechanical heart valve.
 (b) What are the advantages and disadvantages of mechanical heart valves?
 (c) Write a short note on peripheral vascular resistance. [5+5+6]
3. (a) Using a P-V curve of a lung, explain the normal breathing mechanism.
 (b) Describe the process of airway mechanics. [8+8]
4. (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]
5. (a) Discuss the viscoelastic properties of Synovial fluid.
 (b) Explain the instrument used to test a bio-viscoelastic fluid. [8+8]
6. Write a short note on:
 - (a) Non-Newtonian fluid flow of blood.
 - (b) Rheological properties of blood.
 - (c) Cassons equation. [5+5+6]
7. (a) Write a short note on mechanical properties of Trabecular Bone Tissue.
 (b) Justify bone as a living organ.
 (c) Explain briefly, the composition, structural organization of meniscus. [5+5+6]
8. (a) How the RBC moves in a tightly fitted tube whose diameter is less than RBC.
 (b) Explain the inverse FAHRAEUS-LINDQUIST effect. [8+8]

Code No: 07A51105

R07**Set No. 3**

III B.Tech I Semester Examinations, May 2011
BIOFLUIDS AND MECHANICS
Bio-Medical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. Discuss about cell-free layer and how does it affect the hematocrit value in narrow tubes? Explain about the distribution of suspended particles in narrow rigid tubes. [16]
2. (a) Write a short note on air-way resistance?
 (b) Discuss about lung diseases by indicating their cause for development of diseases. [8+8]
3. Discuss in detail the Physical, Chemical and Rheological properties of blood and write a short note on yield stress of blood. [16]
4. (a) Discuss about the composition and mechanical properties of collagen fibres.
 (b) Write a short note on the terms viscoelasticity and pseudo-elasticity critically? [8+8]
5. (a) Write a short note on viscoelastic and elastic materials.
 (b) Draw Kelvin model and derive its basic governing equation. [8+8]
6. Write a short note on:
 - (a) Normal stress and Normal strain with examples.
 - (b) Difference between Normal stress and Shear stress.
 - (c) Young's modulus and Poisson's ratio. [6+5+5]
7. (a) Discuss the viscoelastic properties of Synovial fluid.
 (b) Describe the experimental set up to evaluate the friction coefficient between two articular cartilage surfaces. [8+8]
8. (a) Describe the mechanical properties of arterioles and capillaries.
 (b) Differentiate between laminar and turbulent flow.
 (c) Derive an expression for laminar resistance and mention the factors on which the flow resistance depends. [5+5+6]
