Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS APRIL/ MAY 2017
SUBJECT: BIOFLUIDS & BIOMECHANICS (BME 320)
(REVISED CREDIT SYSTEM)
Saturday, 29th April 2017, 2 to 5 pm

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer any FIVE full questions.**
2. **Draw labeled diagram wherever necessary.**

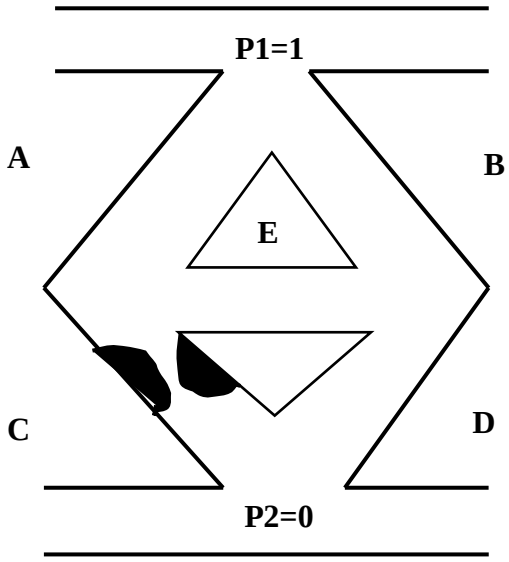
1A Illustrate the various spatial parameters of a human gait cycle. **6**

1B Compare laminar blood flow and turbulent blood flow. **6**

1C Differentiate parallel muscle fiber arrangement from penniform muscle fiber arrangement. **8**

2A. By considering the composition of blood, explain why blood is a non-Newtonian fluid. **6**

2B. If an idealized network is upset by a sphincter (in the branch C) shown below, mention the possible changes that might happen in the total n/w with reasons, when the blood has to flow from 1 to 2? Assume that A, B, C, D, E branches are equal in diameter and length. **6**



2C. Define viscosity and derive the Newton's law of viscosity. **8**

3A. Define "peripheral resistance" to blood flow in a vascular tree. Also, explain about the "seat" of vascular resistance. **6**

3B. Explain about the viscoelastic nature of the protoplasm. **6**

3C. Derive and obtain the differential equation for Maxwell model. **8**

4A. Explain the mechanical properties of capillaries. **6**

4B. Draw the pressure-volume curves for a normal functioning lung and an excised human lung (separately) and compare them. **6**

4C. Diagrammatically represent the following major categories of mechanical prosthetic heart valves. **8**

(i) Caged-ball
(ii) Caged-disk
(iii) Tilting-disk
(iv) Bileaflet pivoting-disk

5A. Describe about the following skin abnormalities which can be detected by durometer. **6**

(i) Scleroderma
(ii) Lipodermatoscelrosis
(iii) Neuropathic foot

5B. How do you explain the non-linear phase in the force-deformation curve for tendon and ligament? **6**

5C. Explain the mechanical properties of skin. **8**

6A. Write the functions performed by a muscle. **6**

6B. Explain the biomechanics of trabecular bone. **6**

6C. With appropriate examples, define the following muscle action. **8**

(i) Agonist
(ii) Antagonist
(iii) Stabilizer
(iv) Neutralizer