GANPAT UNIVERSITY

B.Tech. Semester V (BM&I) Regular Examinations Nov/ Dec 2015
2BM 505 Cardiovascular System and Dynamics

Time:- 3 Hours
Marks:- 70

Instructions:
1. Answer to the questions must be written in separate answer books.
2. Figure to the right indicate marks.
3. Assume data, if needed.
4. Conventional terms / notations are used.
5. All the questions are compulsory.

SECTION-I

Q.1 [12]

(a) What do you understand by Constitutive modelling? Give and explain "Power Law Constitutive model for Blood". [6]

(b) Draw and explain the pressure variations in the systemic circulation. [6]

OR

Q.1 [12]

(a) Write a short note on Pulsatile flow in elastic channel. [3]

(b) Define blood and write a short note on 'Blood Hematology'. [6]

(c) Define the following terms: [3]
   i)   Deformation
   ii) Pseudo plasticity

Q.2 [11]

(a) Write a short note on Wind kessel model. [5]

(b) Write a short note on mechanical activities of heart. [6]

OR

Q.2   **[11]**

   (a) Derived the generalized Bernoulli's equation for pressure and flow in   **[6]**
       blood vessel. Explain its physiological and clinical relevance.

   (b) Draw and explain the ECG waveforms for different heart related   **[5]**
       diseases.

Q.3   Answer the following: **[12]**

   (a) Write a short note on hemodynamic in vascular channel.   **[6]**

   (b) What is cardiovascular systems & dynamics? Discuss the scope of the   **[6]**
       subject. And give the applications of this subject.

SECTION-II

Q.4   **[12]**

   (a) What is Reynolds number? Calculate the Reynolds number in human   **[6]**
       aorta at rest with a cardiac output of 5 litre/min. Based on the reynold
       number, define the type of blood flow. (Given: Diameter of aorta is 2.5
       cm, blood density is 1.08 gm/cm^3 and viscosity is 0.045 Pa.s)

   (b) Explain the Newton's law of motion applied to a bio-fluid.   **[4]**

   (c) Define the following terms.   **[2]**
       i) Non Newtonian fluid
       ii) Mechanics

OR

Q.4   **[12]**

   (a) Give the difference between stroke work and cardiac work for P-V   **[4]**
       loop.

   (b) Define shear stress and shear strain of human blood.   **[4]**

   (c) Explain the statement that deceleration of fluid causes the positive   **[4]**
       pressure gradient that help to close heart valve.

Q.5   **[11]**

   (a) Explain how the ventricular pressure- volume loop changes in valve   **[6]**
       disease.

   (b) Describe the Compliance and elastance for artificial blood vessel graft.   **[5]**

OR

Q.5 [11]

(a) For one complete cardiac cycle of heart, explain electrical impulse conduction system with diagram. [5]

(a) Explain the following terms: [6]
   i. Bingham Plasticity
   ii. Kinetics
   iii. Dicrotic notch

Q.6 Answer the following: [12]

(a) Derive the expression for Newton's law of Viscosity. [6]

(b) Describe the Poiseulli's law and its significance in different blood vessels. [6]

-----END OF PAPER-----