GANPAT UNIVERSITY

B.Tech. Semester V Biomedical and Instrumentation Engineering
Regular Examinations Nov/ Dec 2012
3BM 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

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

  (b) Write a short note on 'Blood Hematology'.   6

OR

Q.1

  (a) Define the following terms: 4
     i)   Rigidity
     ii)   Pseudo plasticity
     iii) Deformation
     iv) Non Newtonian fluid

  (b) What do you understand by Constitutive modelling? Give and   2+3
explain   "Power Law Constitutive model for Blood".

  (c) Write a short note on Pulsatile flow in elastic channel   3

Q.2

  (a) Explain the ventricular pressure- volume curve.   5

  (b) Describe the Poiseulli's law and its significance in different blood   4
vessels.

  (c) Discuss Strouhal number.   2

OR

Q.2

    (a) Write a short note on electrical activities of the heart.   **6**

    (b) What is Reynolds number? Calculate the Reynolds number in   **1+3+1**
    human 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 3 cm, blood density is 1.06 g/cm^3 and
    viscosity is 0.035 Pa·s)

Q.3   Answer the following:

    (a) Write a short note on Wind kessel model.   **6**

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

SECTION-II

Q.4

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

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

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

OR

Q.4

    (a) What is cardiac cycle? Explain the various events of cardiac cycle   **1 + 7**
      in detail with neat diagram.

    (b) Enlist the differences between laminar flow and turbulent flow.   **4**

Q.5

    (a) Explain how the ventricular pressure- volume loop changes in   **8**
    valve disease.

    (b) Describe the Compliance and elastance.   **3**

OR

Q.5

    (a) Write a short note on Angiology.   **6**

    (b) Define the following terms: **5**

Viscosity
Bingham Plasticity
Kinetics
Kinematics
Dicrotic notch

Q.6   Answer the following:
        (a)   What is Bernouli's equation? Explain its physiological and   6
        clinical relevance.

        (b) What is cardiovascular systems & dynamics? Discuss the scope of   2+2+2
        the subject. Also give the applications of this subject.

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