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Date:. 27/05/2014.

Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: VIII (Biomedical & Instrumentation) Engineering

Regular Examination May - June 2014

2BM803 Transportation Phenomena in Living Systems

Time: 3 Hours **Total Marks: 70**

Instruction:
1 Write each section in separate answer book.
2 Answer should be brief and to the point.
3 Figure to the right indicates marks.
4 Assume suitable data, if necessary.

Section - I

Que. – 1 **12**

a) Differentiate Heat and Temperature.

b) How the radiation heat transfer is takes place in human body? Write the mathematical equation for it and determine the heat transfer rate.

OR

Que. – 1 **12**

a) How the conduction heat transfer is takes place in human body? Write the mathematical equation for it and determine the heat transfer rate.

b) Why is the heat of vaporization more at body temperature? Also give a mathematical proof.

Que. – 2 **11**

a) What are the assumptions of Pennes bioheat model? Write the standard thermal diffusion equation for pennes model.

b) Write short note on: Chen-Holmes (CH) continuum model

OR

Que. – 2 **11**

a) What is Biomedical Mass Transport? Analyze the respiration gas transport process.

b) Draw the neat diagram for mass transfer across systemic capillaries. Explain in detail.

Que. – 3 **12**

a) Draw the structure of blood perfused tissue and explain in detail. Show the temperature equilibration between blood and tissue.

b) Draw the functional block diagram of dialysis system. Explain how mass transfer occurs in this system.

Section – II

Que. – 4 **12**

a) Explain oxygen transport in human body with necessary equations.

b) Explain Reverse osmosis membrane structures and properties.

OR

Que. – 4 **12**

a) Define an electroosmosis. What is the cause of electro osmosis?

b) Define mass transfer with appropriate examples

c) Derive the equation for the average heat transfer coefficient.

Que. – 5 a) What is the difference of heterogeneous and homogeneous reactions? **11**

b) Derive the equation for the average heat transfer coefficient.

OR

Que. – 5 **11**

a) Describe mass transport in circulatory system.

b) Define:

1. Reaction rate
2. First order reaction
3. Equilibrium constant
4. Chloride shift
5. Haldane effect

Que. – 6 **12**

a) Write short note on diffusion controlled reaction.

b) What is the importance of activation energy in chemical reaction and catalyst?

END OF PAPER