Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/BME/SEM-7/BME-702/2012-13

2012

ARTIFICIAL ORGANS & REHABILITATION ENGINEERING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) In artificial oxygenator, defoaming is carried out by passing oxygenated blood over

      a) Polyethylene coated screen

      b) Silicone coated screen

      c) Dacron coated screen

      d) Nylon coated screen.

   ii) Cupraphan is a membrane used in

      a) Oxygenator b) Bioreactor

      c) Hemodialyzer d) Audiometer.

iii) Conductive hearing loss is due to the

a) Damage of cochlea

b) secondary root problem in middle ear

c) problems in the air conduction route

d) damage auditory route.

iv) Blood corpuscles while passing through small capillaries, deform into

a) Biconcave disc b) Spherical shaped

c) Round shaped d) Bullet shaped.

v) Above 50 sec^{-1} shear rate, blood behave like

a) Newtonian fluid b) Non-Newtonian fluid

c) Pseudo plastic fluid d) Plastic fluid.

vi) The bone conduction route is

a) Having no function with basilar membrane

b) Having function with Eustachian tube

c) Having no function with external auditory meatus

d) None of these.

vii) Moderate loss of hearing falls in the range of

a) 10-15 dB b) 41-55 dB

c) 61-70 dB d) None of these.

viii) Frequency response of a hearing aid must be

a) 10-10 kHz b) 25-50 kHz

c) 20-20 kHz d) 20-10 kHz.

ix) The maximum resistance offer in hemodialysis by

a) Blood film

b) Dialysate film

c) Hemodialysis membrane

d) Flow rate.

x) The optimum blood flow rate in hemodialyzer is

a) 200 ml/min b) 400 ml/min

c) 600 ml/min d) 800 ml/min.

xi) In socket design, the principle of 'total contact' (double wall sockets) is followed to avoid

a) edema

b) bone healing

c) hypersensitive reaction

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain the Newtonian and Non-Newtonian behaviour of blood. What do you understand by the plasma skimming phenomenon ? 3 + 2

3. What do you mean by "Rheological properties of blood" ? Explain the effect of hematocrit on blood viscosity. 2 + 3

4. Explain the basic mechanism of artificial waste disposal. Mention different methods of waste removal. What is middle molecule hypothesis ? $2 + 1\frac{1}{2} + 1\frac{1}{2}$

5. What are the different types of engineering concept which are commonly used in improving communication disorder ? 5

GROUP – C

(Long Answer Type Questions)

Answer the following. $3 \times 15 = 45$

6. a) Mention the different types of hearing losses (conductive, sensorineural and mixed) by drawing different audiograms.

   b) What is masking and why it is important in audiometry ?

   c) Describe the hearing aid with special notes on transducers. 6 + 4 + 5

7. a) Define the term impairments and disabilities.

   b) Briefly explain on the different parameters of GAIT.

   c) Draw the functional diagram of an audiometer. 5 + 5 + 5

8. Why an artificial lung is needed during bypass heart surgery ? Describe membrane oxygenator with a neat sketch. What is the need of recirculation of dialysate ? Explain the recirculating of dialysis system. 3 + 4 + 2 + 6