



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (BME)/SEM-7/BME-702/2010-11**

**2010-11**

**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 the following :  $10 \times 1 = 10$

i) Insulin is produced from proinsulin by the splitting of

- a) A-peptide                      b) B-peptide  
c) C-peptide                      d) D-peptide.

ii) An example of a biological transducer is

- a) Blood                              b) Cochlea  
c) Eardrum                          d) Hormone.

iii) Whole blood is considered to be a

- a) Fluid                                b) Non-Newtonian fluid  
c) Viscous fluid                      d) Dilute fluid.



- iv) For fixation of cadaveric heart valves the type of solution used is
- a) Glutararaldehyde      b) Formaldehyde  
c) Sulphuric acid      d) Normal saline.
- v) Cupraphan is a membrane used in
- a) Oxygenator      b) Bioreactor  
c) Hemodialyzer      d) Audiometer.
- vi) Spectacle is an example of
- a) Orthotic device      b) Prosthetic device  
c) Supporting device      d) Additive device.
- vii) Blood cells when passing through small capillaries become
- a) Round shaped      b) Bullet shaped  
c) Disc shaped      d) Sickle shaped.
- viii) An example of mechanical heart valve is
- a) Iron valve      b) Ball & Caged valve  
c) Titanium valve      d) Tissue valve.
- ix) Type-I Diabetes Mellitus is a/an
- a) age related disorder      b) auto-immune disorder  
c) genetic disorder      d) none of these.
- x) Rehabilitation falls under the category of
- a) primary prevention      b) secondary prevention  
c) tertiary prevention      d) none of these.



**GROUP – B**

**( Short Answer Type Questions )**

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

2. What are the different types of cardiac valves ? Explain with examples.  $3 + 2$
3. What are the basic criteria of a biocompatible scaffold ? Explain with reference to artificial skin grafting.  $2 + 3$
4. Define orthosis and prosthesis ? What do you understand by human gait cycle ?  $2 + 3$
5. What do you understand by Rehabilitation aids ? Explain with examples.  $2 + 3$
6. Explain the Non-Newtonian behaviour of blood. What do you understand by the plasma skimming phenomenon ?  $3 + 2$
7. Discuss the basic mechanism of artificial waste disposal. Mention different methods of waste removal. What is middle molecule hypothesis ?  $2 + 2 + 1$

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

8. How is skin grafting done ? What are the different design parameters for skin grafting ? Explain the REDY system with reference to Artificial Kidney. Give the functional diagram of the hemodialyzer.  $3 + 4 + 5 + 3$
9. Explain the functioning of a Heart Lung Machine. What are the different types of oxygenators used ? What is preening ? How is it useful ?  $6 + 6 + 2 + 1$
10. What is pure tone audiometry ? Give the functional diagram of an audiometer. What is masking in audiometry ? What is bone conduction hearing ?  $5 + 5 + 3 + 2$



11. Describe the Liver Assist Device ( LAD ). What is the need of recirculation of dialysate ? Explain the recirculating of dialysis system. What is "BUN" and its significance ?

4 + 2 + 7 + 2

12. What is haemodialyzer ? What do you understand by counter-current exchange in an haemodialyzer ? With the help of suitable diagrams, explain the different types of haemodialyzers. What is cross-current and current flow.

3 + 3 + 5 + 4

13. What are the different types of prosthetic heart valves ? Explain with the help of diagrams. What is the process of regeneration of artificial skin.

5 + 5 + 5

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