Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institute of Manipal University)
Manipal – 576 104

IV SEMESTER B.Tech. (BME) DEGREE END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: BIOMEDICAL EQUIPMENTS (BME 208)

(REVISED CREDIT SYSTEM)

Thursday, May 12th, 2016, 2.00 p.m.- 5.00 p.m.

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer any FIVE full questions.**
2. **Draw labeled diagram wherever necessary**

1. (a) (i) What are the types and modes of operation of positive pressure ventilators? Explain. (6)
(ii) Calculate the vital lung capacity and the functional residual capacity, given the tidal volume = 500ml, inspiratory reserve volume =3000ml, expiratory reserve volume = 1000ml and the residual volume=1500ml. (3)

(b) (i) Differentiate 'Thorpe' flow meter from the 'pressure compensated' flow meter. Also, discuss the principle of working of each type. (2+4)

(c) (i) Define the following: CPAP and PEEP. (2)
(ii) Explain why a low amplitude and high frequency signal is used for measuring respiration in impedance Pneumograph. (3)

2. (a) (i) Differentiate 'Speech Discrimination' test and 'Speech Reception threshold' test. (4)
(ii) Determine which type of implant can be used for subjects with severe conduction hearing loss? Explain the same in detail. (5)

(b) (i) Define 'masking' in audiometry. Explain the different types of masking noise that are are used in audiometers. (2+3)
(ii) Write a note on 'capsule endoscope' (4)

(c) Name the endoscope used to visualize the (i) Urinary tract (ii) Uterus (2)

3. (a) What are the factors to be considered while designing incubators? (5)

(b) (i) Discuss the advantage of placing a vaporizer within the closed circuit of the anesthesia machine. Illustrate the same with a figure and explain. (2+5)
(ii) What is 'dark packing fraction'? Why is it not present in the rigid lens system? (2)

(c) List the three different types of apnea. Explain how infant apnea can be monitored using the impedance method. (6)

4. (a) (i) The maximum sound intensity that the ear can tolerate at 1KHz is approximately $1W/m^2$. What is the maximum displacement in air corresponding to this intensity? (Z=430 for air). (2)

(ii) Explain the different phenomena that can take place when ultrasound interacts with the tissue. (5)

(b) Explain an invasive method that uses sound waves to fragment the renal calculi. (5)

(c) (i) What is the range of temperature that is selected to image the legs using thermography? (2)

(ii) What are the advantages and disadvantages of thermography over other imaging modalities? Explain the different types of detectors used in thermographs. (3+3)

5. (a) What are the problems in bypassing only the heart and using patients own lung for oxygenation during open heart surgery? With a neat figure, explain the total heart-lung bypass. (2+5)

(b) Why are membrane oxygenators considered to be better than the other types of oxygenators? Explain the principle of oxygenation in the membrane oxygenator. (2+3)

(c) What are the drawbacks of using the conventional method for blood cell counting? Explain how the laser light can be used to count blood cells. (2+6)

6. (a) What are the main components of the dialysis machine? Explain in detail. (6)

(b) Differentiate peritoneal dialysis from hemodialysis. (5)

(c) (i) Compare the mechanical valves with biological valves. (4)

(ii) What are the drawbacks of caged ball valves? How do tilting disc valves overcome these problems? (2+3)