Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.Tech (BME) DEGREE MAKE-UP EXAMINATIONS JUNE 2017

SUBJECT: MEDICAL EQUIPMENTS (BME 3202)

(REVISED CREDIT SYSTEM)

Saturday 17th June 2017: 2 PM to 5 PM

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

Instructions to Candidates:

Answer ALL questions

1. (a) i) Explain the indirect method for the measurement of respiration. What is the advantage of this method over the direct method? (6+1)

(ii) Explain the following terms: (a) Inspiratory Reserve volume (b) Functional Residual capacity (c) Kymograph. (3)

(b) (i) Differentiate 'cuirass' from 'iron lung' ventilators and explain the four types of positive pressure ventilators. (2+4)

(ii) Determine the subject's inspiratory reserve volume, given the following information: Total lung capacity=5L, Vital capacity=4.1L, tidal volume=700ml, Expiratory reserve volume=1.1L. (3)

(iii) Identify the flow meter which is insensitive to gas composition and gas temperature. (1)

2. (a) (i) Differentiate 'speech reception threshold' test from 'speech discrimination' test. (4)

(ii) Determine which type of implant can be used for subjects with severe conduction hearing loss? Explain the same in detail. (5)

(iii) Calculate the sound pressure level (in dB) of a subject, given the measured sound pressure is 0.06Pa and the threshold of normal hearing is 20µPa. (2)

(b) (i) Name the endoscope used to visualize the (i) Urinary tract (ii) Uterus (iii) interior of a joint (3)

(ii)Write a note on the channels and valves of endoscopes. What is the diameter (range) of the routine upper endoscope? (5+1)

3.	(a)	(i) What is apnea? Explain with a neat block diagram, the infant apnea monitor.	(1+6)
		(ii) Differentiate 'air mode incubator' from 'radiant warmer'.	(3)
	(b)	(i) What are the different modes of operation of the ESU? With neat waveforms, mention the specifications for 'cutting' and 'coagulation' techniques used in ESU.	(5+3)
		(ii) What is 'dark packing fraction'? Why is it not present in the rigid lens system?	(1+1)
4.	(a)	(i) Explain an invasive method that uses sound waves to fragment the renal calculi.	(4)
		(ii) If an ultrasonic beam has an original intensity of $10W/cm^2$ and the returning echo is $0.001W/cm^2$, what will be their relative intensity?	(2)
		(iii) Explain the B-mode and M-mode of ultrasound scan in detail along with few medical applications of the same.	(5)
	(b)	(i) List the characteristic features required for an ideal heart lung machine.	(4)
		(ii) Give a comparison of the different oxygenators used in the heart- lung machine.	(5)
5.	(a)	(i)Why is thermography considered a good imaging modality for early diagnosis of cancer? With a neat figure, explain the thermography equipment in detail.	(2+5)
		(ii) What are the drawbacks of the microscopic method of blood cell counting? With a neat figure, explain how laser can be used to count the blood cells.	(1+5)
	(b)	With a neat figure, discuss the most efficient design of a hemodialyser. Also, explain the principle of peritoneal dialysis.	(5+2)