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# MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

## VII SEM B.Tech.(BME) DEGREE MAKE-UP EXAMINATIONS DEC/JAN 2018-19

### SUBJECT: MEDICAL EQUIPMENTS (BME 4103)

(REVISED CREDIT SYSTEM)

Saturday, 29<sup>th</sup> December 2018: 2 PM to 5 PM

TIME: 3 HOURS

MAX. MARKS: 50

#### Instructions to Candidates:

Answer ALL questions

1. (a) Identify and explain a breathing therapy unit that uses intermittent breaths to inflate the lungs. (4)
- (b) (i) 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+1)
- (ii) List the advantages and disadvantages of 'body level' hearing aids?
- (c) Identify and explain a flowmeter that is insensitive to gas composition and gas temperature. (3)
2. (a) What are the problems caused by hyperbilirubinemia? Explain how the levels of bilirubin can be monitored in neonates non-invasively. (1+4)
- (b) What are the different signs used to identify the depth of anesthesia? With a neat figure, explain the closed circuit anesthesia machine in detail. (2+3)
3. (a) (i) The round trip travel time for an ultrasound pulse in soft tissue is 30μsec. How deep did the pulse travel and what is the total distance travelled? (2)
- (ii) Compare Simple scan from compound scan and explain the characteristics and use of A-mode display. (3)
- (b) Explain in detail the signal processing steps carried out in the receiver of the ultrasound system to convert the reflected echo into pixel values. (5)

4. (a) With a neat figure, explain the hemodialysis machine in detail. (7)
- (b) Give a comparison of the different oxygenators used in the heart- lung machine. (3)
5. (a) Mention the advantages of thermography over other imaging modalities and explain the thermographic equipment in detail. (1+3)
- (b) Illustrate with a figure, how the renal calculi can be removed using percutaneous ultrasonic method. (3)
- (c) What are the risk factors associated with electro surgery? Explain the precautions to be taken to minimize such risks. (3)