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MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

VII SEM B.Tech.(BME) DEGREE END-SEMESTER EXAMINATIONS NOV/DEC 2018

SUBJECT: MEDICAL EQUIPMENTS (BME 4103)

(REVISED CREDIT SYSTEM)

Tuesday, 27th November 2018: 2 PM to 5 PM

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to Candidates:

1. Answer ALL questions
2. Draw diagram wherever necessary.

1. (a) Compare the frequency range of pure tone audiometers with that of Speech audiometers and explain an audiometric test that can be employed in 'word recognition' testing. (2+2)
- (b) Differentiate 'Thorpe' flowmeter from 'pressure compensated' flowmeter. Discuss the principle of working of gas regulators used in oxygen therapy units. (1+2)
- (c) Give reasons for the following: (1.5+1.5)
 - (i) A low amplitude and high frequency signal is used to measure respiration in the impedance pneumography technique.
 - (ii) Leakage in the system is a serious problem in volume-cycled ventilators as compared to pressure-cycled ventilators.
2. (a) (i) Discuss the characteristics of different voltage waveforms used to perform the different modes in Electrosurgical unit. (3)
- (ii) Give reasons: Bipolar technique is considered to be safer than monopolar technique in ESU. (2)
- (b) Explain an indirect method to detect apnea in neonates. What are the other sensors that can be used in direct methods of respiration measurements? (4+1)
3. (a) (i) What is the attenuation of a 4 MHz ultrasound beam after a two-way trip through a 5 cms thick section of liver? (2)
- (ii) Discuss the characteristics and use of a M-mode display. (3)
- (b) Why is Time-Gain Compensation (TGC) required in ultrasound? With a suitable TGC curve, discuss the various TGC controls that are normally adjustable by the sonographer. (1+4)

4. (a) Give a comparison of the natural and artificial lungs. Also, discuss the advantages and disadvantages of using autogenous lung oxygenation. (3+2)
- (b) Give reasons for the failure of the coil type and parallel plate dialyzer and explain with a neat figure, the most effective design of the hemodialyser. (2+3)
5. (a) With a neat figure, explain the reference method used for counting blood cells. (4)
- (b) Discuss the advantage of placing the vaporizer within the circle circuit of the anesthesia machine, and also explain the characteristics of Phase-3 of surgical anesthesia. (1+2)
- (c) (i) Give reason: Image quality of the fiber-optic endoscopes, is not better than a rigid lens system. (1+2)
- (ii) Explain the principle of video endoscopes.