



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL
(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATIONS, JANUARY - 2021

SUBJECT: BIOMEDICAL EQUIPMENTS [ICE 4016]

TIME: 3 HOURS

27-01-2021

MAX. MARKS: 50

Instructions to candidates : *Answer ALL questions and missing data may be suitably assumed.*

- 1A. What is speech audiometry? Highlight its important features and explain how it differs from pure tone audiometry.
- 1B. What is Impedance Pneumography? With the help of a neat diagram, explain its working principle.
- 1C. A child has profound hearing loss in both the ears due to defect in her inner ear. Suggest a suitable electronic device that can assist the child. Use a neat diagram and explain the working of the suggested device. (2+3+5)
- 2A. Expand the following with respect to respiratory measurements and explain their meaning.
i)TV ii)IRV iii)ERV iv) RV
- 2B. What are the properties of LASER? Explain how LASER beam is produced. Mention any two applications of Ruby LASER.
- 2C. With the help of a neat diagram explain the functioning of CO₂ LASER. Mention any two advantages of CO₂ LASER. (2+3+5)
- 3A. With the help of neat sketches, explain the processes of fulguration and desiccation in medical diathermy.
- 3B. Explain the meaning of the terms attenuation and resolution in medical ultrasounds. Justify the choice of frequencies for different medical ultrasound applications.
- 3C. With the help of neat sketches, explain the display modes (scans) of ultrasonic imaging systems. (2+3+5)
- 4A. What do you mean by infusion pump? Mention any four types of infusion pumps.
- 4B. What is obstructive sleep apnea? Write a note on sensors used in apnea monitoring.
- 4C. Suggest a device that can be used in open heart surgery to support the body during the surgical procedure. Draw the schematic showing its connection and explain the working principle. (2+3+5)
- 5A. List the different factors that are required to be monitored in NICU?
- 5B. What are the characteristics of an ideal artificial kidney? Enumerate the essential features of the membranes used in dialyzer.
- 5C. Mention the different methods used for counting the blood cells. With the help of a neat diagram explain any blood cell counting method that is based on the principle of conductivity. (2+3+5)