

# Question Paper

Exam Date & Time: 13-Jan-2024 (02:30 PM - 05:30 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

V SEM B. Tech (BME) DEGREE MAKE-UP EXAMINATIONS, JAN-2024

### BIOMEDICAL INSTRUMENTATION-II [BME 3152]

Marks: 50

Duration: 180 mins.

#### Descriptive

Answer all the questions.

- |     |   |     |
|-----|---|-----|
| 1A) | Explain the type of liquid-liquid chromatography and explain the same in detail. Also mention one application of the same.  | (4) |
| 1B) | Compare the different electrosurgical techniques. Also, explain the safety mechanism in ESU to prevent fire hazard.   | (4) |
| 1C) | Determine the different functions performed by the anesthesia machine.  | (2) |
| 2A) | Explain the different phenomena that can take place when ultrasound interacts with tissue and determine the advantage/disadvantage of each of these phenomenon.   | (4) |
| 2B) | With a neat figure, determine how ultrasound can be used in echocardiography.   | (4) |
| 2C) | Ultrasound beam has an initial intensity of $10\text{mW/cm}^2$ . The return echo is $0.01\text{mWcm}^{-2}$ . Calculate the dB loss.                               | (2) |
| 3A) | Illustrate with a neat figure, the automated optical method of counting blood cells.  | (4) |
| 3B) | Compare the detectors used in thermography. Also, indicate why this imaging modality is more suitable for cancer risk-population identification?                  | (4) |
| 3C) | The speed of sound in the human body is $1500\text{m/s}$ . If a fetus is $6\text{cm}$ below the mother's skin, how long will it take for the echo to be received? | (2) |
| 4A) | Illustrate a type of oxygenator which causes least trauma to the blood cells. Also, indicate the reason for longer exposure times used in artificial lungs.       | (4) |
| 4B) | Give a comparison of the natural and artificial lungs. Also, discuss the advantages and disadvantages of using autogenous lung oxygenation.                       | (4) |
| 4C) | Compare the bubble oxygenator with the membrane oxygenators.  | (2) |
| 5A) | Illustrate the principle of peritoneal dialysis. Also, mention its advantages and disadvantages.  | (4) |
| 5B) | Determine the characteristics of the ideal artificial kidney.   | (4) |
| 5C) | Indicate purpose of including the proportioning system and the dialysate temperature control system in the dialysis machine.                                      | (2) |

-----End-----