

Master of Biomedical Engineering Examination, 2022
(1st Year, 2nd Semester)

Advanced Biomedical Instrumentation

Time: Three hours

Full Marks: 100

Answer **any five** questions

- Q-1) How sub-carrier oscillator and FM transmitter work in frequency division multiplex system used for the transmission of biosignals? Draw circuit diagrams and explain your answer. 10 + 10 = 20 Marks
- Q-2) Describe and explain with neat sketch the principle of circle ventilation in anaesthesia machine. Mention the safety systems of anaesthesia machine and explain the operation of each of the safety system. 14 + 6 = 20 Marks
- Q-3) Describe and explain with sketches the operation of CO₂ LASER. Draw the energy level diagram of this LASER. Mention some applications of CO₂ LASER. 20 Marks
- Q-4) Explain with circuit diagram how radiofrequency power amplification is done in electrosurgery machine? Explain with circuit diagram the operation of an electrosurgery testing machine. 15 + 5 = 20 Marks
- Q-5) (a) Draw digital and analog fibre optic driver circuit and explain their operation. 10 Marks
- Q-5) (b) Explain how does electromagnetic shock wave generation system in lithotripsy machine operate? Include neat sketch in your answer. 10 Marks
- Q-6) (a) Describe and explain Interferential Current therapy method with neat sketch. 10 Marks
- Q-6) (b) How does dialysate temperature controller in hemodialysis machine operate? explain with circuit diagram. 10 Marks
- Q-7) Draw the block diagram of medical linear accelerator machine used in radiotherapy. Describe and explain the functioning of each block briefly. 20 Marks
- Q-8) A digital filter has the following transfer function 20 Marks

$$H(Z) = \frac{1 - Z^{-6}}{(1 - Z^{-1})(1 - Z^{-1} + Z^{-2})}$$

What is its gain at dc?

Find and plot its amplitude response