Ref. No.: EX/PG/BME/T/128A/2024

Master of Biomedical Engineering Examination, 2024

(1st Year, 2nd Semester)

Advanced Biomedical Instrumentation

Time: Three hours **Full Marks: 100**

Answer **any five** questions

Q-1)	Describe and explain with neat sketches how does a Frequency Division Multiplex (FDM) system operate for the transmission and reception of biosignals	20 Marks
Q-2)	Describe an anaesthesia machine with neat sketch and explain its operation	20 Marks
Q-3)	Describe Helium-Neon LASER and explain its principle of operation. Mention some of its applications.	20 Marks
Q-4) (a)	Explain how "chronaxie" and "rheobase" are read from "intensity-time" curves.	5 Marks
Q-4) (b)	Describe and explain Interferential Current therapy method with neat sketch	15 Marks
Q-5) (a)	Draw digital and analog fibre optic driver circuit and explain their operations	10 Marks
Q-5) (b)	How radio-frequency signal is generated in an electro-surgery machine? Explain with circuit diagrams	10 Marks
Q-6) (a)	How does electromagnetic shock wave generation system in lithotripsy machine operate and how these waves are focused? Explain with sketches.	15 Marks
Q-6) (b)	Mention the components of medical linear accelerator machine used in radiotherapy.	5 Marks
Q-7)	Explain how dialysate temperature controller and blood leak detector in haemodialysis machine work. Include circuit diagram and sketches in your answer.	20 Marks

[Turn over

Q-8) A digital filter has the following transfer function 20 Marks

$$H(Z) = \frac{1 - Z^{-2}}{(1 - 1.0605Z^{-1} + 0.5625Z^{-2})}$$

Find the amplitude and phase response of this filter