Ref. No.: EX/PG/BME/T/128A/2025

Master of Biomedical Engineering Examination, 2025

(1st Year, 2nd Semester)

Advanced Biomedical Instrumentation

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

Answer **any five** questions

Q-1)	Describe with neat sketches the transmission and reception sections of a biotelemetry system and explain its operation	20 Marks
Q-2)	Describe an anaesthesia machine with neat sketch and explain its operation	20 Marks
Q-3)	Describe Ruby LASER and explain its principle of operation	20 Marks
Q-4) (a)	Explain how "chronaxie" and "rheobase" are read from "intensity-time" curves.	5 Marks
Q-4) (b)	Describe and explain with an example the operation of Transcutaneous Electrical Nerve stimulation	15 Marks
Q-5) (a)	Draw digital fibre optic driver circuit and explain its operation	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)	Explain the piezoelectric method of shock wave generation in lithotripsy machine and explain how these waves are focused? Include sketch in your answer.	15 Marks
Q-6) (b)	Mention the components of medical linear accelerator machine used in radiotherapy.	5 Marks
Q-7)	Explain the operation of a haemodialysis machine. Include circuit diagram and sketches in your answer	20 Marks
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