


Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Programme Name: B.Tech Instrumentation and Control Engineering (ICE)	Semester : VII
Course Name : BIOMEDICAL INSTRUMENTATION	Time : 03 hrs
Course Code : ELEG437	Max. Marks : 100
Nos. of page(s) : 2	

Instructions: 1) Mention Roll No at the appropriate place in the question paper.
 2) Answers should be brief and concise.
 3) All questions are compulsory.

SECTION A

S. No.		Marks	CO
Q 1	Elucidate the need of electrode-tissue interface for surface electrodes with electrode jelly (with diagram).	5	CO1
Q 2	Elucidate the important factors that decide the choice of a particular transducer to be used in study of a specific phenomenon in biomedical applications.	5	CO1
Q 3	Discuss all possible types of biomedical signals and their physiological sources in human body.	5	CO1
Q 4	Define the following terms with respect to sensor characteristics: a) Sensitivity; b) Drift; c) Resolution; d) Span; e) Precision	5	CO1

SECTION B

Q 5	Discuss a Multi-Channel Wireless Telemetry System along with its block diagram and its components.	10	CO2
Q 6	Discuss the process of analog signal processing by Pulse Oximetry.	10	CO2
Q 7	Discuss the Doppler principle of Ultrasound based Cardiac Output (blood flow and volume) measurement along with its necessary calculations.	10	CO2
Q 8	Explain the working (with block diagram) of a patient monitoring system required to monitor a critically ill patient recovering from surgery, heart attack or serious illness.	10	CO2

SECTION-C

Q 9A	Design a Microcontroller controlled spectrophotometer (explain its working with its block diagram).	10	CO3
Q 9B	Evaluate the advantages and biological effects of NMR Imaging Systems in	10	CO3

	Biomedical Instrumentation.		
Q 10A	Analyze the physics and advantages of Ultrasonic waves in Biomedical Instrumentation.	10	CO3
Q 10B	Design a Microcontroller controlled Ventilator (explain its working with its block diagram).	10	CO3

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SECTION A

S. No.		Marks	CO
Q 1	Elucidate all possible types of biomedical signals and their physiological sources in human body.	5	CO1
Q 2	Discuss the significance of human safety and comfort while designing biomedical instruments.	5	CO1
Q 3	Define the following terms with respect to sensor characteristics: a) Sensitivity; b) Drift; c) Resolution; d) Span; e) Precision	5	CO1
Q 4	Elucidate the need of electrode-tissue interface for surface electrodes with electrode jelly (with diagram).	5	CO1

SECTION B

Q 5	Discuss a Multi-Patient Biomedical Telemetry System along with its block diagram and its components.	10	CO2
Q 6	Discuss the working principle and the block diagram of Doppler-Shift blood flow-meter (a non-invasive method for blood flow measurement).	10	CO2
Q 7	Explain the working (with block diagram) of a patient monitoring system required to monitor a critically ill patient recovering from surgery, heart attack or serious illness.	10	CO2
Q 8	Discuss the general constraints in the design process of biomedical instrumentation systems and the important factors that decide the choice of a particular transducer to be used in study of a specific phenomenon in biomedical applications.	10	CO2

SECTION-C

Q 9A	Analyze the physics and advantages of Ultrasonic waves in Biomedical Instrumentation.	10	CO3
Q 9B	Design a Microcontroller controlled Ventilator (explain its working with its block	10	CO3

	diagram).		
Q 10A	Analyze the advantages and biological effects of MRI Imaging Systems in Biomedical Instrumentation.	10	CO3
Q 10B	Design a sensor based programmable infusion pump - automated drug delivery system (explain its working with its block diagram).	10	CO3