	FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGERIA **SCHOOL OF ELECTRICAL ENGINEERING AND TECHNOLOGY** **DEPARTMENT OF MECHATRONICS ENGINEERING** **FIRST SEMESTER 2019/2020 ACADEMIC SESSION**	
	MCE 532: BIOMEDICAL INSTRUMENTATION	
	TIME ALLOWED: 2 HOURS	**CREDIT UNIT:** 2 **LEVEL:** 500
Instruction: Attempt Any 4 (four) Questions.		

Question 1. (25marks)

(a) What makes the biomedical Instrument differs from other conventional Instruments. Explain with the use of well labeled figure and detailed explanation.

(b) With the aids of block diagram, describe a typical biomedical Instrumentation System that could be used for measuring vital signals or parameters associated with COVID-19.

(c) What sensors in Biomedical and Physiological instrument could be used for measuring or acquiring the following: i. ECG ii. EMG iii. EEG iv. Blood flow v. Respiratory rate

Question 2. (25marks)

(a.) Define the term "Electroencephalograph" as used in biomedical instrumentation

(b.) Sketch the typical signals waveform produced by the Electroencephalogram system.

(c.) State the frequency band for the following EEG:

(i.) Delta (ii.) Theta (iii.) Alpha (iv.) Beta (v.) Gamma

Question 3. (25marks)

(a) In compensating for the loss in biomedical instruments during design, what technicality should be adopted when: (i.) modifying input signal cannot be avoided? (ii.) interfacing and modifying of the input signal cannot be filtered?

(b) Of what relevance is instrument characterization in biomedical Engineering.

(c) How can the potential difference by generated in biomedical instrumentation system?

Question 4. (25marks)

(a) Define the term "Electrocardiogram" as used in biomedical instrumentation

(b) Sketch the typical signals waveform produced by the Electrocardiogram system**.**

(c) With a well labelled human body sketch, show how potential are measured, draw it circuit equivalent and give brief explanation of what the circuit represents.

Question 5. (25marks)

(a.) Define the term "Electromyograph" as used in biomedical instrumentation.

(b.) Sketch the typical signals waveform produced by the Electromyograph system.

(c.) Differentiate between surface and the deep-seated electrodes with substantive point.