BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : VII/ADD**
BRANCH: EEE **SESSION : MO/19**

SUBJECT: EE7215 BIO ELECTRONICS INSTRUMENTATION

TIME: 3:00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	What is human-computer interaction system?	[2]
Q.1(b)	Draw the structure of heart and name main arteries and veins of the cardiovascular system.	[4]
Q.1(c)	Explain the cardiac physiology in a cardiac cycle considering the electrophysiology and hemodynamic activities of heart.	[6]
Q.2(a)	Draw the general action potential curve and label different cellular events.	[2]
Q.2(b)	How cardiac muscles maintain their rhythmicity?	[4]
Q.2(c)	How large nerve and muscle fibers maintain their resting potential at -90mV. What electrical activity will occur when single external stimulus is given to these fibers?	[6]
Q.3(a)	What is the working principle of the transducer used for recording of pulse?	[2]
Q.3(b)	Why Ag/AgCl electrodes are appropriate for the preparation of disposable electrodes for recording of electrophysiological information?	[4]
Q.3(c)	How ionic information generated inside the body is acquired as electrical information for processing and display? Explain the model of skin-electrode interface for a surface electrode.	[6]
Q.4(a)	Write the signal characteristics of pulse and EMG signals.	[2]
Q.4(b)	Explain the ultrasonic mechanism of blood flow measurement.	[4]
Q.4(c)	With the help of block diagram, explain the mechanism of analog biopotential recorder. How the machine is calibrated for chart recording?	[6]
Q.5(a)	What do you mean by cardiac fibrillation?	[2]
Q.5(b)	Illustrate the types of output waveforms used for defibrillation.	[4]
Q.5(c)	Explain the working principle of a cardiac defibrillator used in ICU. What types of electrodes are used in these defibrillators?	[6]
Q.6(a)	Write the working principle of ultrasonic diathermy?	[2]
Q.6(b)	What are the different waveforms used for different modes of electrosurgery?	[4]
Q.6(c)	Draw the setup of an electrosurgical diathermy and explain the function of each block of the machine.	[6]
Q.7(a)	How tachogram is calculated?	[2]
Q.7(b)	Write different frequency bands of the EEG signals. How it varies in different vigilance states?	[4]
Q.7(c)	Design a biosignal based human-machine interface system to control the multi directional movement of motorized patient wheelchair.	[6]

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