Q. P. Code : EC0820311C-I   (Pages: 2)

Name: ....

Reg. No: ....

THIRD SEMESTER M. TECH. DEGREE EXAMINATION FEBRUARY 2021

Branch: Electronics and Communication Engineering   **Specialization: CESP & ECE**

08EC7211(C) BIOMEDICAL SIGNAL PROCESSING

(Common to Communication Engineering and Signal Processing and Electronics & Communication Engineering)

Time: 2 hour 15 minutes   Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1. a	Explain the major objectives of biomedical signal analysis.	3

Answer b or c

b	Explain how action potential is generated within the human body.	6
c	Explain 12-lead system in ECG recording with the help of diagrams.	6

Q. No.	Module 2	Marks
2. a	Identify at least three potential sources of physiological artifacts in recording the EEG signal.	3

Answer b or c

b	Design an optimal filter to remove noise from a signal, given that the signal and noise processes are independent, stationary, random processes. The noise characteristics may also be assumed to be known.	6
c	Discuss the application of ICA for EEG signal analysis.	6

Q. No.	Module 3	Marks
3. a	What are the potential sources of artifacts in recording the ECG signal?	3

b   What is the significance of Einthoven's triangle?   6

c   Give an account of the various epochs in an ECG waveform and their intervals.   6

Q. No.	Module 4	Marks

4. a   Explain Heart Rate Variability.   3

Answer b or c

b   Explain Pan-Tompkins algorithm to detect QRS complexes in an ongoing ECG signal.   6

c   Design a frequency-domain filter to remove periodic artifacts such as power-line interference.   6

Q. No.	Module 5	Marks

5. a   Explain on the electrical activity of brain.   4

Answer b or c

b   Describe a frequency-domain approach to study the presence of rhythms in multiple channels of an EEG signal.   8

c   With the help of block diagram explain the brain-computer interface   8

Q. No.	Module 6	Marks

6. a   Discuss on medical image formats.   4

Answer b or c

b   With a suitable algorithm, substantiate the adaptive segmentation of EEG signals.   8

c   Propose a method for parametric representation of nonstationary EEG signals.   8