

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD – 402 103**

Summer Semester Examination, May 2018

Branch: M. Tech. (Electronics Engineering)
Subject with Subject Code: Advanced Biomedical Signal Processing
[MTEEE244A]

Semester: II
Marks: 60

Date: 21 / 05 / 2018

Time: 3 Hrs.

Instructions to the Students

1. Figures to the right indicate the full marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram, etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q.1 Attempt any two (12)

- a) Explain the deterministic, stochastic, and fractal signals?
- b) Explain biomedical signals other than EMG and ECG?
- c) Explain phonocardiogram with three channel simultaneous record of PCG, ECG and carotid with neat sketches of the genesis of heart sound?

Q.2 Attempt any two (12)

- a) Explain Maternal-Fetal ECG in details with its modeling.
- b) A non-causal LSI system has an impulse response given by $h[k] = \delta[k+1] - \delta[k-1]$
 - i) Determine its response to the input signal $x[k] = \cos(pk)$. The system is initially at rest.
 - ii) Calculate the output when $P=4$; when $P=2\pi$.
- c) Draw and explain the diagram of biomechanics of airflow into and out of lungs?

Q.3) Answer the following (12)

- a) How the cocktail party problem is applied to EEG Signals, Explain in detail?
- b) What are the different techniques employed for the removal of baseline wander from the ECG signal.

Q.4 Answer the following (12)

- a) What are different signal processing techniques to remove the power line interference?
- b) Explain spectral analysis of heart rate variability with block diagram?

Q.5 Answer the following (12)

- a) Draw the block diagram of computer aided diagnosis and therapy used in biomedical signal analysis?
- b) Draw the block diagram and explain the loss less and lossy data compression used in biomedical signal processing?

Q.6 Answer the following (12)

- a) How the heart rhythm events can be represented mathematically?
- b) What are the different types of artifacts in EEG and how they can be filtered out?