

(BM-208) - Biomedical Electronics

Course Outline:

Theory:

- 1. Operational Amplifiers**
 1. Analysis of OP-AMP action
 2. OP-AMP specifications
 3. Interpreting OP-AMP data sheet
 4. Offset voltage and current
 5. Temperature rating
 6. Output swing
 7. Gain, CMRR
- 2. Basic OP-AMP Configuration Circuits**
 1. Inverting amplifiers
 2. non-inverting amplifiers
 3. Voltage follower
 4. Summing amplifiers
 5. Integrator and differentiator
- 3. Instrumentational Amplifier**
 1. Sensing and Measuring with the instrumentation amplifier
 2. Instrumentation amplifier as a signal conditioning circuit
- 4. Active Filters Design**
 1. Basic Low Pass filters
 2. Introduction to Butterworth filters
 3. High pass and Bandpass Butterworth filters
 4. Notch filters
- 5. A/D and D/A converters**
- 6. Selected Applications of OP-AMPs in Biomedical Engineering**
- 7. Signal Acquisition and Conditioning of ECG using OP-AMPs**

List of Practicals:

1. Design and Analyze OP-AMP Based Inverting Amplifier
2. Design and Analyze OP-AMP Based Non-Inverting Amplifier
3. Design and Analyze the characteristics of Summing Amplifier
4. To study Characteristics of Differential Amplifier
5. To determine common mode rejection ratio (CMMR)
6. Design and Analyze OP-AMP Based Integrator
7. Design and Analyze OP-AMP Based Differentiator
8. Design and Analyze Instrumentation Amplifier
9. Designing an ECG Amplifier.
10. To Analyze Analog to Digital Converter
11. To Analyze Digital to Analog Converter
12. Designing and analyzing frequency response of Active Low Pass Filter
13. Designing and analyzing frequency response of Active High Pass Filter
14. Designing and analyzing frequency response of Active Band Pass Filter
15. Designing and analyzing frequency response of Active Band Stop Filter/
16. Project : ECG/EMG/ EOG/PPG Amplifier and filters

Suggested Teaching Methodology:

- Lecturing
- Written Assignments Report Writing

Suggested Assessment:

Theory (100%)

- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

Laboratory (100%)

Text and Reference Books:

1. Electronics Design by Floyd 9th Edition
 2. Operational amplifier and linear integrated circuits by Robert Coughlin
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