**BBE3104 Instrumentation and Control Systems Engineering**

CourseContent

**Basicconceptsofinstrumentation**

Basic transducers principles-Amplifiers and signal processor-The origin of bio potentials – Bio potential l electrodes- Bio potential l amplifiers and measurements: ECG ,EMG ,EEG ,ERG ,etc machines-Data acquisition and distribution: D/A converters ,A/D converters, S/H, and Analog Mux- Microcomputer design-Therapeuticequipment:cardiacpacemakers,cardiacdefibrillators, hemo dialysis machine, instruments for surgery and ventilators.

**FrequencyDomainApproach**

Examples of feedback control systems, dynamic characteristics-Representation using transfer function concept-Block diagrams and signal flow graphs- Characteristicsof feedback control systems - Transient response analysis, the root locus method, Rout-Hurwitz stability criterion-Frequency response analysis, polar plots, simplified Nyquistcriterion

**TimeDomainApproach**

Fundamentals of linear vector spaces and matrix algebra-Transformation of state coordinates - Eigenvalues,Eigenvectors,andexp(At)-Derivingthestate-variablemodel-State-spaceAnalysis: Continuous time

**FrequencyDomainApproach**

Frequency response(cont.),logarithmic plots, relative stability criterion-Correlation between relative stability measures in transient and frequency responce- Introduction to design,series and feedback compensation-Correlation between frequency and time domain approaches(transfer functions and state equations)-Output versus state feedback-Revision.

**TimeDomainApproach**

StatespaceAnalysis:Discretetime-Controllabilityandobservability-Stabilityoflinearsystems-

Method of Lyapunov-Design of linear feedback control systems**-**Linear time-varying state models - Revision.

Requirements

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| --- | --- | --- | --- | --- | --- | --- | --- |
| HoursperSemester | | | | Weighted  Total Mark | WeightedExam  Mark | Weighted  Continuous  Assessment Mark | Credit  Units |
| LH | PH | TH | CH | WTM | WEM | WCM | CU |
| 45 | 00 | 30 | 60 | 100 | 60 | 40 | 4 |