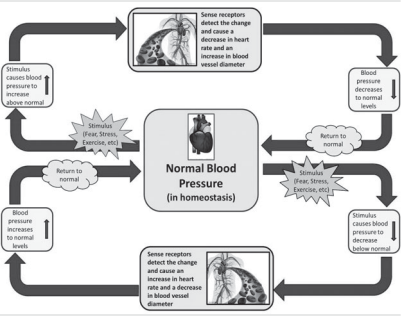

16BM302 BIOCONTROL SYSTEMS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	48	6	12	3	5

Course Description and Objectives:

This course offers to study various control systems and there modeling. The main objective the course is to impart knowledge of time and frequency response modeling of bilological systems in analyzing any given system and also useful to analyze the given system in time domain and frequency domain. Its study includes the techniques of plotting the responses in both domains, application and analysis of biological systems.

Course Outcomes:

The student will be able to:

- find out various bio control systems.
- equip the student with necessary knowledge on analysis and design parameters.
- analyze the time and frequency domains of the given system using different mathematical techniques.
- understand the stability analysis of the given system.
- gain the concept of physiological control system.
- get the concept and different mathematical techniques applied in analyzing any given system.

SKILLS :

- ✓ *Introduction to various biological control systems.*
- ✓ *Equip the students with necessary knowledge on analysis and design parameters.*
- ✓ *Gain knowledge about application of various mathematical techniques in designing of Bio control systems.*
- ✓ *Analyze a biological system.*

UNIT - 1 **L-9, T-3**

OPEN AND CLOSED LOOP SYSTEMS: Mathematical models of physical systems, Transfer functions; Block diagram algebra, Signal flow graphs, Feedback characteristics of control systems; Control systems and components; DC and AC servomotors, Principles of stepper motors.

UNIT - 2 **L-9, T-3**

STANDARD TEST SIGNALS: Time response of first order and second order systems; Design specifications of second order systems; Proportional controller; Proportional derivative controller; Proportional-Integral Controller Proportional-Integral-Derivative Controller Performance indices of control systems; Necessary conditions for stability; Hurwitz and Routh stability criteria, Relative stability.

UNIT - 3 **L-9, T-3**

CONCEPT AND CONSTRUCTION OF ROOT LOCUS: Root contours, Frequency response analysis, Correlation between time and frequency response, Bode plots, Stability in frequency domain, Nyquist stability criteria.

UNIT - 4 **L-9, T-3**

TYPES OF PHYSIOLOGICAL CONTROL SYSTEMS: Difference between general control systems and physiological control systems, Examples of positive and negative feedback physiological control systems; Body temperature Regulation; Blood glucose regulation, Pupil Control System, Visual Fixation System, Oculo-motor System, Muscle stretchreflex, Skeletal muscle Servo-mechanism.

UNIT - 5 **L-9, T-3**

CARDIOVASCULAR CONTROL SYSTEMS: Regulation of heart rate, Blood pressure and cardiac output, Respiratory Control System, Chemical regulation of ventilationm Cheyne Stokes breathing.

TEXT BOOKS:

1. A. Nagoor Kani “Digital Signal Processing”, 2nd edition, Tata Mc. Graw Hill, 2012.
2. NagrathI.J and Gopal M., “Control Systems Engineering”, 3rd edition, New Age Publishers, 2002.

REFERENCE BOOK:

1. Michael C. Khoo, “Physiological Control Systems-Analysis, Simulationand Estimation”, IEEE Press, 2000.

ACTIVITIES:

- *Analysis of time and frequency domains.*
- *Create simple models of biological systems.*
- *Determine response in for a control system.*
- *Characterize physical system based on bode plots.*