Syllabus for B.Tech – Energy Engineering

Course Number & Title: EN208 – Control and Instrumentation	
L-T-P-C: 3-0-0-6	
Offered in (Odd/ Even / Any): Semester IV	
Pre-Requisite: Nil	
Preamble / Objectives (Optional): The objective of this course is to provide the students a better foundation in control system as well as instrumentation in the context of energy system studies. This course deals with the background knowledge of principles of measurements and errors in the context of energy systems. An overview of applications of electronics and microcontroller in control systems as well as software intervention is also presented. Some of the typical measuring and control instruments related to energy systems are discussed.	
Course Content/ Syllabus: Overview of control systems, transfer function, block diagram representation and reduction techniques; overview of instruments and measurement systems: principles of measurements and measurement errors, classification of instruments, static and dynamic characteristics; sensor and transducers: types, characteristics and applications of mechanical and electrical transducers; signal conditioning: operational amplifier types, characteristics, applications; analog/digital/analog conversion techniques; data acquisition systems: single channel A/D converter, multi-channel A/D converter; digital data processing and display; microprocessor and microcontrollers; applications for monitoring and control of electrical and non–electrical parameters/processes; use of compilers	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".	
Texts: (Format: Authors, *Book Title in Italics font,* Volume/Series, Edition Number, Publisher, Year.)	
1.	K Ogata, *Modern Control Engineering*, Prentice-Hall of India Pvt. Ltd., New Delhi, 5th edition, 2021.
2.	A S. Morris, *Principles of Measurements and Instrumentation*, Prentice-Hall of India Pvt. Ltd., New Delhi, 3rd Edition, 2001.
References: (Format: Authors, *Book Title in Italics font,* Volume/Series, Edition Number, Publisher, Year.)	
1.	D P Kothari, *Control Systems Engineering (Theory and Problem)*, New Age International Private Limited, 2017.
2.	A K Sawhney, *A Course in Electrical And Electronic Measurements And Instrumentation*, Shree Hari Publications, 2021.
3.	J Crisp, *Introduction to Microprocessors and Microcontrollers*, Newnes, 1st edition, 2004.
4.	R Gaonkar, *Microprocessor Architecture, Programming and Applications with 8085*, Penram International Publishing, 6th edition, 2013.