Lecture plan for 5th semester, B.E. (ICE), Year 2020 – 21

Subject: Process Dynamics & Control **Subject Code: ICC16**

Course No.	Title of Course	Credits	Course Structure	Pre-Request
ICC16	Process Dynamics & Control	4	3 – 0 - 2	

UNIT - I	
Incentives for chemical process Control,	**01**
Design aspects of process control system, Hardware for process control system.	**02**
Modeling the Dynamic and static behavior of Chemical Process.	**05**
Linearization of non-linear systems.	**02**
1st CLASS TEST	
UNIT - II	
Dynamic behavior of 1st order, 2nd order and Higher- order systems.	**03**
Introduction to feedback Control, Dynamic Behavior of feedback Controlled processes. Introduction to Proportional (P), Integral (I), Derivative (D) controllers, PI & PID controllers. Detailed comparison of PID controller algorithms. Derivative action on process output vs. error. Problems with proportional "kick" and reset "wind-up".	**04**
MID SEMESTER EXAMINATION	
UNIT - III	
Stability analysis of feedback systems.	**01**
Design of Feedback Controllers.	**02**
Frequency Response Analysis of Linear Processes, Design of feedback Control Systems using Frequency Response Techniques.	**02**
UNIT - IV	
Feedback Control of systems with large dead time or Inverse Response.	**02**
Cascade Control, Selective Control Systems, Split- range Control.	**02**
Feed-forward Control, Ratio Control, Inferential Control Systems,	**02**
2nd CLASS TEST	
UNIT - V	
Final Control Element: Signal Conversion (I/P or P/I converters) Actuators, pneumatic control valves, valve petitioners and design of pneumatic control valve.	**02**
Introduction to Programmable Logic Controller (PLC) and its programming.	**03**
Introduction to Supervisory Control & Data Acquisition (SCADA) Systems, Distributed Control System (DCS) and Modern Industrial Communication protocols.	**02**
TOTAL	**35**

Text Book: G. Stephanopoulos. Chemical Process Control. *An Introduction to Theory and Practic*e**,** Pearson Education, 1984.

References:

- D. R. Coughanowr. *Process Systems Analysis and Contro*l, New York: McGraw-Hill.
- D. E. Seborg, T. F. Edgar, and D. A. Mellichamp. *Process Dynamics and Contro*l, 2nd ed., Wiley, 2003.
- Curtis Johnson. Process Control Instrumentation Technology, 7TH ed., Pearsoned Education.
- B.Wayne Bequette, Process Control: Modelling Design and simulation, Prentice Hall India, 2002.
- Instrument Engineers' Handbook, Fourth Edition, Volume Two- Process Control and Optimization by Liptak