

<b>Course Number and Name</b>												
BEE050 & Process Control Engineering												
<b>Credits and Contact Hours</b>												
3 & 45												
<b>Course Coordinator's Name</b>												
Mr.K.S.Prasad												
<b>Text Books and References</b>												
1. Stephanopoulos. G, "Chemical Process Control - An Introduction to Theory and Practice", Prentice Hall of India, 2005.												
2. Johnson .C.D, "Process Control Instrument Technology", Prentice Hall Inc., 2004.												
<b>Course Description</b>												
To enable the students to learn the basic concepts of process control and to develop sufficient knowledge of the various control actions and design of controllers used to control any process.												
<b>Prerequisites</b>						<b>Co-requisites</b>						
Control System						Nil						
required, elective, or selected elective (as per Table 5-1)												
Required												
<b>Course Outcomes (COs)</b>												
CO1: Learn the basic control actions and. Compute the Mathematical Model for different process.												
CO2: Analyse the characteristics of different types of Controllers and selection of controller.												
CO3: Select ,design and tune a controller to suit a particular process												
CO4: Identify the basic components of a final control element and distinguish the different Characteristics of control valve.												
CO5: Understand and analyze the concept of multi loop control techniques												
<b>Student Outcomes (SOs) from Criterion 3 covered by this Course</b>												
COs/ POs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	H	H	L		L				H			M
CO2	M	H	M		L				M			M
CO3	M	H	H		M				H			M
CO4	H	M	M		L				M			M
CO5	M	M	L		M				M			M
<b>List of Topics Covered</b>												

**UNIT I MATHEMATICAL MODELLING OF PROCESS 9**

Process control introduction – Need for process control –Hardware elements of a process control system – Need of Mathematical modelling –Mathematical model of level, pressure ,thermal processes and interacting and non-interacting systems– Servo and Regulator Operation – Batch & Continuous Process – Concept of self regulation– Dead time–Degrees of freedom – Linearization.

**UNIT II VARIOUS CONTROLLERS AND ITS CHARACTERSTICS 9**

Characteristics of ON- OFF, Single speed floating and PID controllers – Response of P,PI and PID controllers to various type of error signals – Analysis of Servo and Regulatory response of P and PI and PID controllers for first order and second order process – Reset Wind-up and prevention – Derivative and Proportional kick –Bumpless transfer – Selection of a controller for a particular process

**UNIT III CONTROLLER DESIGN 9**

Need for controller tuning –Evaluation criteria - Quarter Decay Ratio, IAE, ISE and ITAE– Optimum controller tuning using Evaluation criteria–Tuning of PID controllers using Process reaction curve method, Damped oscillation method and Z-N tuning method.

**UNIT IV FINAL CONTROL ELEMENTS 9**

I/P, P/I converters – Final control elements - Pneumatic and electric actuators -Types of control valves - Valve positioner and its importance - Inherent and Installed characteristics of control valve - Control valve sizing - Cavitation and flashing.

**UNIT V MULTI LOOP CONTROL 9**

Feed-forward control – Ratio control – Cascade control – Inferential control – Split-range and introduction to multivariable control – Examples from distillation column and boiler systems – IMC– Model Predictive Control – Adaptive control – P&ID diagram.