SRM UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CHEMICAL ENGINEERING
COURSE PLAN

Course Code : CH2005
Course Title : **Advanced Process Dynamics and Control**
Semester : II
Course Time : Jan– May

Location : Department of Chemical Engineering

Prerequisite : Nil

References :

1.Stephenopoulous G ,Chemical process control: an introduction to theory and practice1St Edn. Prentice Hall, New Delhi, 1998
2.Coughanour D.R, "Process System Analysis and Control",2nd Edn.McGraw Hill, New York, 1991.
3.Buckley P.S.,"Techniques of Process Control",Wiley, Newyork, 1964.
4.Douglas,J.M.,"Chemical Process Dynamics and Control ", Prentice- Hall, Englewood Cliffs, Cliffs, N.J., (1972).

Objectives

- Basic concepts of process dynamics and control.
- The design of feedback control systems,
- Various kinds of advanced control systems,
- Dynamics and control of fluid flow, and heat transfer systems,
- Dynamics and control of mass transfer systems.

Assessment Details

Cycle Test – I	: 20 Marks
Surprise Test	: 05 Marks
Model Exam	: 20 Marks
Assignment	: 05 Marks

Test Schedule

S.No.	DATE	TEST	TOPICS	DURATION
1		**Cycle Test - I**		**2 periods**
2		**Surprise Test**		**30 mins**
3		**Model Exam**		**3 hrs**

Outcomes

On successful completion of this module the learner will be able to…

Course outcome	Program outcome
• Identify the relevant temperature and composition measurement methods in different operation. • Solve problems involving control system by laplace transform • Understand the basic concepts of controllers and relate these to process system • Implementation of micro-based controllers.	To provide students with an introduction to process control technology to control processes. Upon completion, students should be able to comprehend principles of process control technology and the application of various instruments used to control processes in an industrial setting.

Detailed Session Plan

Distinctive characteristics of dynamics of chemical process and systems; process control objectives and strategies. Review of first and higher order systems.					
Session No.	**Topics to be covered**	**Time (min)**	**Ref**	**Teaching Method**	**Testing Method**
1	Distinctive characteristics of dynamics of chemical process and systems	50	2	BB	**Problem sets**
2	Distinctive characteristics of dynamics of chemical process and systems	50	2	BB	**Problem sets**
3	Distinctive characteristics of dynamics of chemical process and systems	50	2	BB	**Problem sets**
4	Process control objectives strategies.	50	2	BB	Case Studies
5	process control objectives strategies	50	2	BB	**Case Studies**
6	Review of first and higher order systems	50	2	BB	**Case Studies**
7	Review of first and higher order systems	50	2	BB	**Case Studies**
8	Review of first and higher order systems	50	2	BB	**Oral exams.**
9	Review of first and higher order systems	50	2	BB	**Oral exams.**
Closed and open loop response. Response to step, impulse and sinusoidal disturbances. Types of control valves, Design of valves. Transient response. Block diagrams.					
10	closed and open loop response	50	1	BB	**Oral exams.**
11	closed and open loop response	50	1	BB	**Portfolios**
12	closed and open loop response	50	1	BB	**Oral exams**
13	Response to step, impulse and sinusoidal disturbances.	50	1	BB	**Portfolios**

14	Response to step, impulse and sinusoidal disturbances.	50	1	BB	**Portfolios**
15	Types of control valves	50	1	BB	**Short-answer tests.**
16	Design of valves	50	1	BB	**Group Discussion**
17	Transient response.	50	1	BB	**Essay tests.**
18	Block diagrams.	50	1	BB	**Group Discussion**
Frequency response, Design of feedback control systems, Zigler-Nicholas and Cohen-coon tuning methods, Bode-Nyquist plot-Process modeling.					
19	Frequency response,	50	1,2	BB	**Problem sets**
20	Frequency response,	50	1,2	BB	**Problem sets**
21	Design of feedback control systems	50	1,2	BB	**Essay tests.**
22	Design of feedback control systems	50	1,2	BB	**Essay tests.**
23	Design of feedback control systems	50	1,2	BB	**Problem sets**
24	Cohen-coon tuning methods,	50	1	BB	**Problem sets**
25	Bode- plot	50	2	BB	**Problem sets**
26	Nyquist plot	50	2	BB	**Oral exams.**
27	Process modeling.				
Ratio control, cascade control, adaptive control, feed forward control, valve position control, computed variable control, over ride control, split range control.					
28	Ratio control	50	2	BB	**Essay tests.**
29	cascade control	50	1,2	BB	**Essay tests.**
30	cascade control	50	1,2	BB	**Essay tests.**
31	adaptive control	50	2	BB	**Essay tests.**
32	feed forward control	50	2	BB	**Essay tests.**
33	valve position control	50	2	BB	**Essay tests.**
34	computed variable control,	50	2	BB	**Essay tests.**
35	over ride control	50	1,2	BB	**Essay tests.**
36	split range control.	50	1,2	BB	**Essay tests.**
Dynamics and control of fluid flow systems, pressure and level systems, blending systems, heat transfer systems.Dynamics and control of mass transfer systems, distillation units and chemical reactors. Overall process control.					
37	Dynamics and control of fluid flow systems	50	2	BB	**Multiple-choice tests.**
38	Dynamics and control of fluid flow systems	50	2	BB	**Essay tests.**
39	Pressure and level systems	50	2	BB	**Oral exams.**
40	Pressure and level systems	50	2	BB	**Multiple-choice tests.**

41	Blending systems	50	2	BB	**Essay tests.**
42	Heat transfer systems.	50	2	BB	**Oral exams.**
43	Dynamics and control of mass transfer systems	50	2	BB	**Essay tests.**
44	distillation units	50	2	BB	**Multiple-choice tests.**
45	Chemical reactors, Overall process control.	50	2	BB	**Essay tests.**