

LESSON PLAN OF 5TH SEMESTER

Process Control

Name of Faculty: Rajni

Discipline: Instrumentation & Control Engg.

Semester: 5th

Subject: Process Control

Lesson Plan Duration: 15weeks

Work load (Lecture /Practical) per week (in hours): Lectures—04, Practical—03

Week		Theory		Practicals
	Lecture Day	Topic (including assignment/test)	Practical week	Topic
1st	1st	Brief introduction about subject and syllabus	1	To find the differential gap of on-off control system
	2nd	Basic Control Loops and Characteristics		
	3rd	Basics of process control,		
	4th	process variables		
2nd	5th	Revision	2	To study a control loop of tank level control using on-off control
	6th	single capacity processes		
	7th	multi capacity processes		
	8th	single capacity level,		
	8th	pressure, temperature		
3rd	9th	flow loop systems. Process lag,	3	To study the control loop of a system for a flow contro
	10th	measurement lag		
	11th	transmission lag and dead time		
	12th	Revision		
4th	13th	Controller Modes and Characteristics Concept of on-of	4	To rig up an electronic proportional controller unit
	14th	proportional, integral controllers, their examples, merits and demerits		
	15th	derivative, PD controllers, their examples, merits and demerits		
	16th	PI and PID controls, their examples, merits and demerits		
5th	17th	Revision	5	To rig up an electronic proportional integrated controller unit
	18th	Electrical Control Elements Construction		
	19th	principle of operation of solenoids		
	20th	stepper motor,		
6th	21st	limit switches, relays	6	To rig up an electronic PID controller and verify its working
	22nd	auto transformer		
	23rd	magnetic amplifier		
	24th	Revision/Test		

7th	25th	Pneumatic and Hydraulic Control Elements	7	To study and obtain the input/output relationship of a pneumatic relay
	26th	Pneumatic pressure supply		
	27th	pneumatic actuator, pneumatic relay		
	28th	pneumatic amplifiers, electro-pneumatic actuators,		
8th	29th	flapper-nozzle system	8	To study the characteristics and controller specifications of different types of control valves and their repair and maintenance
	30th	bellows, air filter and regulator		
	31st	Hydraulic actuators and valves,		
	32nd	electro hydraulic actuators		
9th	33rd	Revision	9	To determine the characteristics of a control valve with positioner and without positioner
	34th	Control Valves Principle of operation and		
	35th	constructional details of solenoid valve		
	36th	Revision		
10th	37th	Revision/Test	10	To study the control loop of a system for pressure control
	38th	Diaphragm operated valve,		
	39th	Globe valve		
	40th	Ball valve		
11th	41st	Butterfly valve	11	To study the construction and working of a pressure switch
	42nd	Discussion of previous Topic/Problems		
	43rd	valve positioners.		
	44th	Control valve characteristics		
12th	45th	sizing and selection of valves	12	To study the construction and working of a temperature switch
	46th	Revision/Test		
	47th	Temperature switches, Flow switches		
	48th	Pressure switches,		
13th	49th	interlocking and sequencing circuits	13	To study the construction and working of a float type of level switch
	50th	Revision of previous topics		
	51st	class test		
	52nd	need of interlocks, annunciators		
14th	53rd	revision	14	viva voice
	54th	Problem solving		viva voice
	55th	Revision of previous topics		viva voice
	56th	Previous year Question Paper discussion		
15th	57th	Previous year Question Paper discussion	15	viva voice
	58th	revision		viva voice
	59th	revision		
	60th	revision		viva voice

Analytical and Environmental Instruments

Name of Faculty: Anjani Kumar

Discipline: Instrumentation & Control Engg.

Semester: 5th

Subject: Analytical and Environmental Instruments

Lesson Plan Duration: 15weeks

Work load (Lecture /Practical) per week (in hours): Lectures—04, Practical—03

Week		Theory		Practicals
	Lecture Day	Topic (including assignment/test)	Practical week	Topic
1st	1st	Brief introduction about subject and syllabus	1	To find conductivity of a given solution
	2nd	Fundamental blocks of analytical instruments (brief details)		
	3rd	Topic contd.		
	4th	Topic contd. And assignment		
2nd	5th	Spectroscopic analysis: overview of chapter	2	File check/Viva Voice
	6th	Brief concept of Absorption spectroscopy		
	7th	Absorption spectroscopy contd.		
	8th	Discussion on Absorption spectroscopy		
3rd	9th	Brief concept NMR spectroscopy	3	To measure total dissolved solutions in water
	10th	NMR spectroscopy contd.		
	11th	Class test/assignment		
	12th	Brief concept of Mass spectroscopy		
4th	13th	Mass spectroscopy contd.	4	File check/Viva Voice
	14th	Discussion on topics based on spectroscopy		
	15th	Gas analysis: Topic discussion		
	16th	Infra-red gas analyzer: Principle of working		
5th	17th	Infra-red gas analyzer: Block diagram	5	To measure oxygen content dissolved in water
	18th	Paramagnetic oxygen analyzers: Principle of working		
	19th	Paramagnetic oxygen analyzers: Block diagram		
	20th	Thermal Con. Analysis: Principle of working		
6th	21th	Thermal Con. Analysis: Block diagram	6	File check/Viva Voice
	22th	Assignment discussion		
	23th	Class Test		
	24th	Gas chromatography: Topic discussion		
7th	25th	Gas chromatography: Introduction	7	Demonstration of mass spectroscopy
	26th	injectors		
	27th	oven		
	28th	column		
8th	29th	detectors	8	File check/Viva Voice

	30th	infrared analyzer		
	31st	infrared analyzer.. continue		
	32nd	Liquid analysis: Topic discussion		
9th	33rd	Principle of pH measurement	9	Demonstration of gas chromatography To measure noise level To study spectrometer To study thermal conductivity gas analyzer
	34th	Electrodes for pH measurement		
	35th	Electrodes for pH measurement continued		
	36th	Electrochemical analyzer		
10th	37th	Principal of working , construction etc.	10	Viva voice
	38th	Environmental pollution monitoring instruments : Topic discussion		
	39th	Air quality standards		
	40th	revision		
11th	41th	Types and measurement of concentration of various gas pollutants in atmosphere	11	To measure noise level
	42th	Dust measurement		
	43th	Revision/ class test		
	44th	Electrochemical instruments: Introduction		
12th	45th	Electrochemical cell	12	Viva voice
	46th	Types of electrodes		
	47th	Types of electrodes continued		
	48th	Conductivity meters		
13th	49th	Aqua meters	13	To study spectrometer
	50th	Revision/ Problem discussion		
	51st	Test/assignment		
	52nd	Instrumentation used for water pollution Measurement and their monitoring		
14th	53rd	Instrumentation used for water pollution monitoring	14	To study thermal conductivity gas analyser
	54th	Instrumentation used for air pollution Measurement and their monitoring		
	55th	Instrumentation used for air pollution monitoring		
	56th	Assignment		
15th	57th	Viva voice/revision	15	Viva voice
	58th	Viva voice/revision		
	59th	Viva voice/revision		
	60th	Viva voice/revision		

Power Electronics

Name of Faculty: Vikash

Discipline: Instrumentation & Control Engg.

Semester: 5th

Subject: Power Electronics

Lesson Plan Duration: 15weeks

Work load (Lecture /Practical) per week (in hours): Lectures—03, Practical—03

Week	Theory		Practical	
	Lecture Day	Topic(including assignment/test)	Practical week	Practical Topic
1	1(unit 1)	Construction, Working principle of SCR	1	To plot VI characteristic of an SCR.
	2	Two transistor analogy of SCR, V-I characteristics of SCR.		
	3	SCR specifications and ratings.		
2	4	Different methods of SCR triggering.	2	To plot VI characteristics of TRIAC
	5	Different commutation circuits for SCR.		
	6	Series and parallel operation of SCR.		
3	7	Construction and working principle of DIAC, TRIAC and their V-I characteristics	3	To plot VI characteristics of UJT.
	8	Construction, working principle of UJT, V-I characteristics of UJT. UJT as relaxation oscillator		
	9	Brief introduction to Gate Turn off thyristor (GTO), Programmable Uni-junction Transistor (PUT), MOSFET		
4	10	Basic idea about the selection of Heat sink for thyristors	4	To plot VI characteristics of DIAC.
	11	Applications such as light intensity control, speed control of universal motors		
	12	Fan regulator, battery charger.		
5	13(unit 2)	Single phase half wave controlled rectifier with load (R, R-L)	5	File Check/Viva Voice
	14	Single phase half controlled full wave rectifierwith load(R, R-L)		
	15	First sessional test		
6	16	Fully controlled full wave bridge rectifier.	6	Study of UJT relaxation oscillator. And observe I/P and O/P wave forms
	17	Single phase full wave centre tap rectifier.		

	18(unit 3)	Principle of operation of basic inverter circuits, concepts of duty cycle, series and parallel. Inverters & their applications		
7	19	Choppers: Introduction, types of choppers (Class A, Class B, Class C and Class D).	7	Observation of wave shape of voltage at relevant point of single-phase half wave controlled rectifier and effect of change of firing angle
	20	Step up and step down choppers		
	21	Assignment 1		
8	22	Dual Converters and cyclo converters: Introduction, types and basic working principle of dual converters	8	Observation of wave shapes of voltage at relevant point of single phase full wave controlled rectifier and effect of change of firing angle.
	23	Cyclo converters and their applications.		
	24	2nd sessional test revision		
9	25	2nd sessional test	9	Observation of wave shapes and measurement of voltage at relevant points in TRIAC based AC phase control circuit
	26(unit 4)	DC drive control, Half wave drives		
	27	Full wave drives		
10	28	Assignment 2	10	VIVA - VOICE
	29	Revision		
	30	Chopper drives (Speed control of DC motor using choppers)		
11	31	AC drive control, Phase control	11	Varying lamp intensity and AC fan speed control.
	32	Constant V/F operation		
	33	Cycloconverter/Inverter drives		
12	34	Assignment 3	12	Installation of UPS system and routine maintenance of batteries.
	35	μ C based AC/DC drive control		
	36(unit 5)	ON line UPS		
13	37	OFF line UPS	13	Speed control of motor using SCRs
	38	Specifications of UPS		
	39	Concept of high voltage DC transmission		
14	40	Concept of SMPS	14	VIVA-VOICE
	41	3rd sessional test revision		
	42	3rd sessional test revision		
15	43	3rd sessional test	15	VIVA-VOICE
	44	Revision		
	45	Revision		

Process Instrumentation

Name of Faculty: Rajni

Discipline: Instrumentation & Control Engg.

Semester: 5th

Subject: Process Instrumentation

Lesson Plan Duration: 15weeks

Work load (Lecture /Practical) per week (in hours): Lectures—04, Practical—03

Week		Theory		Practicals
	Lecture Day	Topic (including assignment/test)	Practical week	Topic
	1st	Brief introduction about subject and syllabus	1	Measurement of speed using Tachometer
	2nd	Measurement of length		
	3rd	Measurement of angle		
	4th	Measurement of area		
2nd	5th	working principle of vernier calipers	2	File Check/Viva Voice
	6th	working principle of micrometer		
	7th	working principle of comparator		
	8th	Least count of each instrument		
3rd	9th	Revision/Discussion	3	Measurement of stress and strain using strain gauge/ load cell.
	10th	Class test/Assignment		
	11th	Various methods of Measurement of Pressure		
	12th	„		
4th	13st	„	4	File Check/Viva Voice
	14th	Various methods of Measurement of Torque		
	15th	„		
	16th	„		
5th	17th	Various methods of Measurement of Power	5	Study of various types of strain gauge and their construction
	18th	„		
	19th	Various methods of Measurement of Speed		
	20th	„		
6th	21th	Various methods of Measurement of Force	6	File Check/Viva Voice
	22th	„		
	23th	Class test/ Assignment/Discussion		
	24th	Measurement of Stress and Strain: Introduction		
7th	25th	Types of Strain Guages	7	To study the measurement system of pressure using
	26th	„		

	27th	gauge factor		Bouraiou tube method
	28th	Assignment /discussion		
8th	29th	load cells	8	. File Check/Viva Voice
	30th	„		
	31st	temperature compensation		
	32nd	„		
9th	33rd	Discussion	9	Study of torsion dynamometers for measurement of torque
	34th	Test/Assignment		
	35th	Measurement of Motion : Introduction		
	36th	Measurement of Displacement		
10th	37th	Measurement of velocity	10	File Check/Viva Voice
	38th	Measurement of acceleration		
	39th	seismic pickups		
	40th	Thickness Measurement: Introduction		
11th	41th	Thickness Measu: Resistive method	11	Measurement of acceleration torque by accelerometer Measurement of thickness using capacitive transducer To measure the pH value of given solution File checking
	42th	„		
	43th	Thickness Measu: Inductive method		
	44th	„		
12th	45th	Thickness Measu: Capacitive method	12	File Check/Viva Voice
	46th	„		
	47th	- Thickness Measu: Ultrasonic method		
	48th	„		
13th	49th	Measurement of Density	13	feedback from students
	50th	„		
	51st	Measurement of pH,		
	52nd	„		
14th	53rd	Measurement of Viscosity	14	Viva voice
	54th	„		
	55th	Measurement of Humidity		
	56th	Revision/Discussion		
15th	57th	Test/Assignment/Revision	15	Viva voice
	58th	Test/Assignment/Revision		
	59th	Test/Assignment/Revision		
	60th	Test/Assignment/Revision		

EE

Name of Faculty: Guest Faculty

Discipline: Instrumentation & Control Engg.

Semester: 5th

Subject: Environmental Engineering

Lesson Plan Duration: 15weeks

Work load (Lecture /Practical) per week (in hours): Lectures—03, Practical—Nil

	Lecture Day	Topic (including assignment/test)
1st	1st	Definition, Scope of Environmental Education
	2nd	Importance of Environmental Education
	3rd	Revision
2nd	4th	Assignment
	5th	Basics of ecology, biodiversity
	6th	Basics of eco system and sustainable development
3rd	7th	Revision
	8th	Assignment
	9th	Sources of pollution - natural and manmade
4th	10th	Causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear) and their units of measurement
	11th	Revision
	12th	Assignment
5th	13th	Solid waste management – Causes, effects
	14th	Solid waste management – control measures of urban and industrial waste
	15th	Revision
6th	16th	Assignment
	17th	Mining and deforestation – Causes
	18th	Mining and deforestation – effects and control measures
7th	19th	Revision
	20th	Assignment
	21st	Environmental Legislation - Water (prevention and control of pollution) Act 1974
8th	22nd	Environmental Legislation - Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986
	23rd	Role and Function of State Pollution Control Board, Environmental Impact Assessment (EIA)
	24th	Revision
9th	25th	Assignment
	26th	Role of Non-conventional Energy Resources - Solar Energy

	27th	Role of Non-conventional Energy Resources -Wind Energy
10th	28th	Role of Non-conventional Energy Resources -Bio Energy
	29th	Role of Non-conventional Energy Resources- Hydro Energy
	30th	Revision
11th	31st	Assignment
	32nd	Current Issues in Environmental Pollution – Global Warming
	33rd	Current Issues in Environmental Pollution – Green House Effect
12th	34th	Current Issues in Environmental Pollution - Depletion of Ozone layer
	35th	Recycling of Material
	36th	Environmental Ethics
13th	37th	Rain Water Harvesting
	38th	Maintenance of Groundwater
	39th	Acid Rain, Carbon Credits
14th	40th	Revision
	41st	Assignment
	42nd	Revision
15th	43rd	Revision
	44th	Revision
	45th	Revision

E.Skills

Name of Faculty: Vikash

Discipline: Instrumentation & Control Engg.

Semester: 5th

Subject: Employability Skills

Lesson Plan Duration: 15weeks

Work load (Lecture /Practical) per week (in hours): Lectures—Nil, Practical—02

Week		Practicals
	Practical Day	Topic
1st	1	Introduction
2nd	2	Writing skills i) Official and business correspondence
3rd	3	Writing skills ii) Job application - covering letter and resume
4th	4	Writing skills iii) Report writing - key features and kinds
5th	5	viva voice
6th	6	Oral Communication Skills i) Giving advice
7th	7	Oral Communication Skills ii) Making comparisons
8th	8	Oral Communication Skills iii) Agreeing and disagreeing
9th	9	Oral Communication Skills iv) Taking turns in conversation
10th	10	Oral Communication Skills v) Fixing and cancelling appointments
11th	11	viva voice
12th	12	Generic Skills i) Stress management
13th	13	Generic Skills ii) Time management
14th	14	Generic Skills iii) Negotiations and conflict resolution
15th	15	Generic Skills iv) Team work and leadership qualities