SKILL ENHANCEMENT COURSE (SEC P1) - Basic Instrumentation Skills -I						
Programme: **Skill Enhancement Course**					**Year: I**	**Semester: I**
Course Title & Code	**Credits**	**Credit distribution of the course**			**Eligibility Criteria**	**Pre-requisite of the course**
		Lecture/Theory	**Tutorial**	**hands on training**		
SEC P1: Basic Instrumentation Skills -I	2	1	0	2	12th pass	Physics and Mathematics in 12th

Course Outcomes:

1. To understand the basic gain of mechanical tools and errors.
2. To understand the hand on experience of different mechanical and electrical tools.
3. To gain the knowledge of electrical cables, and their specifications.

Unit	Topic (Theory / Experiments/hands on training)	No. of Lectures
Unit I	**Errors and Mechanical Tools:** Instruments accuracy, precision, sensitivity, resolution, range, least count of different instruments, Errors in measurements, Types of errors. Hand tools and their Uses: Identification, specifications, uses and maintenance of commonly used hand tools: Tweezers Screwdriver (Combination Set), Pliers, Wire Cutters, Wire Strippers, Crimping Tools, Sockets & Hex drivers, Clamps, Rotary Tools: Grinders, Portable Drill Machine, Small Hand Saws.	**15**
Unit II	**Electrical & Electronics Cables and Connector** Different type of electrical cables and their Specifications. Types of wires & cables, Standard wire gauge (SWG), Practice on different type of cable joint. Testing phase , neutral and Earth by tester and multi-meter and test lamp.	**15**

Suggested Reading

1. B L Theraja : A text book in Electrical Technology
2. M G Say: Performance and design of AC machines
3. S. Salivahanan & N. S. Kumar : Electronic Devices and Circuits, , 3rd Edn
4. Shashi Bhushan Sinha, Handbook of Repair and Maintenance of Domestic Electronics Appliances hand book.
5. M. Lotia, Modern Basic Electrical & House Wiring Servicing

SKILL ENHANCEMENT COURSE (SEC P2) - Basic Instrumentation Skills -II		
Programme: **Skill Enhancement Course**	**Year: I**	**Semester: II**

Course Title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the course
		Lecture/Theory	Tutorial	**Hands-on training**		
SEC P2: Basic Instrumentation Skills -II	2	1	0	2	As per University Ordinance	The student should have done the Basic Instrumentation Skill **I** course in Sem I

Course Outcomes:

1. To understand the different types of batteries, maintenances and their uses.
2. Knowledge of secondary cells
3. To get the knowledge of the testing of batteries.

Unit	Topic (Theory / Experiments/hands on training)	No. of Lectures
Unit I	**Batteries and Maintenance:** Types of Batteries, Primary Cell, Secondary Cell, Wet charged, Dry-charged, Low maintenance, Construction of Battery, Case Cover plates, Separator, Cells, Electrolyte, Principles of Batteries, Lead Acid battery, Electrochemical reaction, Measure the voltages of the given cells/battery using analog/ digital multimeter, Charge and discharge the battery through load resistor, Maintain the secondary cells, Measure the specific gravity of the electrolyte using hydrometer.	**15**
Unit II	**Testing of Batteries:** Testing Factors affecting charging, Cause of battery failure, diagnosis and testing, visual inspection, Heavy load test Professional, Test a battery and verify whether the battery is ready for use of needs recharging.	**15**

Suggested Reading

1. B L Theraja : A text book in Electrical Technology
2. M G Say : Performance and design of AC machines
3. S. Salivahanan& N. S.Kumar : Electronic Devices and Circuits, , 3rd Edn
4. Shashi Bhushan Sinha, Handbook of Repair and Maintenance of Domestic Electronics Appliances hand book.
5. M. Lotia, Modern Basic Electrical & House Wiring Servicing

Suggested Online Link:

1. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd
3. SwayamPrabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

SKILL ENHANCEMENT COURSE (SEC P3)		
Programme: **Skill Enhancement Course**	**Year: II**	**Semester: III**

Course Title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the course
		Lecture/Theory	Tutorial	**Hands-on training**		

SEC P3: Basic Instrumentation Skills -III	2	1	0	2	As per University Ordinance	As per University Ordinance

Course Outcomes:

1. Hands on practice of domestic wiring and electrical systems.
2. To understand the soldering and practice it's on different electronic components.

Unit	Topic (Theory and hands on practice)	No. of Lectures
Unit I	**Domestic Wiring** Introduction and explanation of electrical wiring systems, cleat wiring, casing & Capping, house wiring, specification and types, rating & material. Demonstration & Practice on connecting common electrical accessories in circuits and testing them in series board., Testing & replacement of different types of fuses, switches, plug, sockets. Identification of different wiring materials and their specification, Removal of insulation from assorted wires and cable, Making a switchboard with electrical accessories, Making an Extension board.	**15**
Unit II	**Soldering :** Solders, flux and soldering technique. Different types of soldering guns related to Temperature and wattages, types of tips, Solder materials and their grading. Use of flux and other materials, Selection of soldering gun for specific requirement, Soldering and De-soldering stations and their specifications. Soldering/ De-soldering and Various Switches, Practice soldering on different electronic components, small transformer, Practice de-soldering	**15**

Suggested Reading

1. B L Theraja : A text book in Electrical Technology
2. M G Say : Performance and design of AC machines
3. S. Salivahanan& N. S. Kumar : Electronic Devices and Circuits, , 3rd Edn
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SKILL ENHANCEMENT COURSE (SEC P4)						
Programme: **Skill Enhancement Course**				**Year: II**	**Semester: IV**	
Course Title & Code	**Credits**	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the course
		Lecture/Theory	Tutorial	**Hands-on training**		
SEC P4: Basic Instrumentation Skills -IV	2	1	0	2	As per University Ordinance	As per University Ordinance

Course Outcomes:

1. To understand the theory and use of CRO
2. To understand the Signal and pulse Generators

Unit	Topic (Theory and hands on practice)	No. of Lectures
Unit I	**Impedance Bridges:** Block diagram of bridge. Working principles of basic (balancing) RLC bridge, Specifications of RLC bridge, Block diagram and working principle as of a Q-meter, Digital LCR bridges.	**15**
Unit II	**Electronic Voltmeter:** Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter, AC millivoltmeter: Type of AC millivoltmeters, Block diagram ac milli -voltmeter, specifications and their significance.	**15**

Suggested Reading

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2. M G Say: Performance and design of AC machines
3. S. Salivahanan& N. S. Kumar: Electronic Devices and Circuits, , 3rd Edn
4. Shashi Bhushan Sinha, Handbook of Repair and Maintenance of Domestic Electronics Appliances hand book.
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SKILL ENHANCEMENT COURSE (SEC P5)						
Programme: **Skill Enhancement Course**				**Year: III**	**Semester: V**	
Course Title & Code	**Credits**	**Credit distribution of the course**			**Eligibility Criteria**	**Pre-requisite of the course**
		Lecture/Theory	**Tutorial**	**Hands-on Training**		

SEC P5: Advanced Instrumentation and Measurement Techniques -I	2	1	0	2	As per University Ordinance	As per University Ordinance

Course Outcome:

1. To understand the Impedance Bridges.
2. To understand the Principle and uses of electronic voltmeter.

Unit	Topic (Theory and hands on practice)	No. of Lectures
Unit I	**Multimeter:** Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. Advantage over conventional multimeter for voltage measurement with respectto input impedance and sensitivity.	**15**
Unit II	**Digital Multimeter:** Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time-base stability, accuracy and resolution.	**15**

Suggested Reading

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2. M G Say : Performance and design of AC machines
3. S. Salivahanan& N. S.Kumar : Electronic Devices and Circuits, , 3rd Edn
4. Shashi Bhushan Sinha, Handbook of Repair and Maintenance of Domestic Electronics Appliances hand book.
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OR

SKILL ENHANCEMENT COURSE (SEC P5)						
Programme: **Skill Enhancement Course**				**Year: III**	**Semester: V**	
Course Title & Code	**Credits**	**Credit distribution of the course**			**Eligibility Criteria**	**Pre-requisite of the course**
		Lecture/Theory	**Tutorial**	**Hands-on Training**		
SEC P5 Electrical circuit network Skills - I	2	1	0	2	As per University Ordinance	As per University Ordinance

Course Outcome:

1. To understand the Impedance Bridges.
2. To understand the Principle and uses of electronic voltmeter.

Unit	Topic (Theory and hands on practice)	No. of Lectures
Unit I	**Electrical Circuit Fundamentals and Series Circuits:** Zero Reference level, Chassis Ground, Ohm's Law, Graphical representation of Ohm's Law, Linear and Non-linear resistor, Cells in series in electrical circuits, Resistances in series circuit, Characteristics, Case of zero IR drop, Polarity of IR drops, Total Power, Series Aiding and series opposing voltages, Proportional voltage formula in series circuits, Series Voltage dividers, opens and Shorts in a series circuit.	**15**
Unit II	**Parallel Electrical circuits:** Cells in parallel in electrical circuits, Parallel resistive circuits, Laws of parallel circuits, Special case of equal resistances in all branches and only two branches, Any branch resistance, Proportional current formula, opens and shorts in a parallel circuit.	15

Suggested Reading

1. B L Theraja : A text book in Electrical Technology
2. B L Theraja : A text book in Basic Electronics
3. M G Say : Performance and design of AC machines
4. S. Salivahanan& N. S.Kumar : Electronic Devices and Circuits, , 3rd Edn
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SKILL ENHANCEMENT COURSE (SEC P6)						
Programme: **Skill Enhancement Course**				**Year: III**	**Semester: VI**	
Course Title & Code	**Credits**	**Credit distribution of the course**			**Eligibility Criteria**	**Pre-requisite of the course**
		Lecture/Theory	**Tutorial**	**Hands-on training**		

SEC P6 Advanced Instrumentation and Measurement Techniques-II	2	1	0	2	As per University Ordinance	As per University Ordinance

Course Outcomes:

To understand the function of analog and digital Multimeter.

Unit	Topic	No. of Lectures
Unit I	**Cathode Ray Oscilloscope:** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only–no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.	**15**
Unit II	**Signal and pulse Generators** Block diagram, explanation and specifications of low frequency signal generator and pulse generator. Brief idea for testing, specifications. Distortion factor meter,wave analysis.	**15**

Suggested Reading

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2. M G Say : Performance and design of AC machines
3. S. Salivahanan& N. S.Kumar : Electronic Devices and Circuits, , 3rd Edn
4. Shashi Bhushan Sinha, Handbook of Repair and Maintenance of Domestic Electronics Appliances hand book.
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OR

SKILL ENHANCEMENT COURSE (SEC P6)						
Programme: **Skill Enhancement Course**					**Year: III**	**Semester: VI**
Course Title & Code	**Credits**	**Credit distribution of the course**			**Eligibility Criteria**	**Pre-requisite of the course**
		Lecture/Theory	**Tutorial**	**Hands-on training**		
SEC P6: Electrical circuit network Skills - II	2	1	0	2	As per University Ordinance	As per University Ordinance

Course Outcomes:

To understand the types of electrical circuits and method of making different types of electrical circuits.

Unit	Topic	No. of Lectures
Unit I	**Series-Parallel electrical circuits and Kirchhoff's:** Series –parallel circuits, Analysing series-parallel circuits, Opens and Shorts in series-parallel circuits, Voltage division in a complex Series-Parallel circuits. Kirchhoff's laws: Kirchhoff's current law, Kirchhoff's voltage law, Determination of Algebraic sign, Assumed direction of current flow, Solving circuit problems using Kirchhoff's laws.	**`15**
Unit II	**Network Theorems:** Concept of electrical Network, Different types of Network Theorems: Superposition Theorem, Application of superposition theorem for solving electrical network problems, Thevenin's Theorem, Procedure for Thevenizing an electrical circuit, Application of Thevenin's theorem, Norton's Theorem, Procedure to Nortonise an electrical circuit, Application of Norton's theorem, Maximum Power Transfer Theorem.	**15**

Suggested Reading

1. B L Theraja : A text book in Electrical Technology
2. B L Theraja : A text book in Basic Electronics
3. M G Say : Performance and design of AC machines
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6. M. Lotia, Modern Basic Electrical & House Wiring Servicing