

**Ch. Ranbir Singh University, Jind**  
**Scheme and Syllabus of Examination for Undergraduate programme**  
**Skill Enhancement Course (PHYSICS)**  
 Under Multiple Entry-Exit, Internships and  
 CBCS-LOCF in accordance to NEP 2020

Semester	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs) T + P
2 <sup>nd</sup> sem	SEC-2	PHY-SEC-225	Electrical Circuit Network Skill	2	2	15	35	50	3
			Practicum	1	2	5	20	25	3
2 <sup>nd</sup> sem	SEC-2	PHY -SEC-227	Physics Laboratory Skill Enhancement	2	2	15	35	50	3
			Practicum	1	2	5	20	25	3
3 <sup>rd</sup> sem	SEC-3	PHY -SEC-329	Basic Instrumentation Skills	2	2	15	35	50	3
			Practicum	1	2	5	20	25	3

SEC-SKILL ENHANCEMENT COURSE								
Course Type	Course Code	Name of the Course	Credit	Contact Hours/ Week	Internal Assessment marks	End Term Marks	Max. Marks	Exam Duration
SEC-2	PHY-SEC-225	Electrical Circuit Network Skills	2	2	15	35	50	3 hrs.
		Practicum	1	2	5	20	25	3 hrs.
Level of the course: NA								
Pre-requisite for the course (if any): NA								
<b>Course Learning Outcomes (CLO):</b> 1. To understand the basic concepts of Electrical Circuits 2. To repair the basic electric fault in circuit. 3. To calculate the monthly bill of any load 4. To create basic skill to make smart home.								
<b>Instructions for Paper-Setter</b> 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.								
UNIT	TOPICS						CONTACT HOURS	
I	<b>Introduction to Electricity and Circuits:</b> Basics of Electricity, Electric charges (positive and negative), Conductors, Insulators, Basic components of a circuit: battery, wires, bulb, switch etc. <b>Basic Electricity Principles:</b> Voltage, Current, Resistance, and Power, Ohm's law, Series, Parallel, and series-parallel combinations. Heating effects of current and applications, AC Electricity (Live, Neutral and Earth), frequency, DC Electricity (Positive and Negative poles).						7	
II	<b>Understanding Electrical Circuits:</b> AC and DC Voltage Sources, Current and voltage drop across the DC circuit elements. Kirchhoff's laws. Instruments to measure current, voltage, power in DC and AC circuits. Familiarization with multimeter, voltmeter, and ammeter, Insulation. Preparation of extension board. Joints in electrical conductors. Techniques of soldering.						8	
III	<b>Electrical Protection:</b> Relays, Fuses and disconnect switches, Circuit breakers, Overload devices, Surge protection. Ground-fault protection. Earthing and its types. <b>Smart Technology:</b> Smart Switches, Wi fi enabled switches, Smart Bulbs, Ways to make Smart home. Estimation of electric load, average electricity bill calculation.						7	

<p style="text-align: center;"><b>IV</b></p>	<p><b>Electrical Appliances:</b> Fan, Bulb, Electric Iron, LEDs, Working of DC &amp; AC Motor, Water Pump, Water Cooler and Air Conditioner. Comparison of Invertor &amp; Non-Invertor Air Conditioners. Invertor, Offgrid &amp; ongrid Solar Systems for home. Ways to save electricity.</p>	<p style="text-align: center;"><b>8</b></p>
<p style="text-align: center;"><b>Practicum</b></p>	<p>(1) To identify electrical components like resistor, capacitor, inductor, battery, switch, ammeter, voltmeter and to find the value of resistance using color coding.</p> <p>(2) To measure the resistance, voltage and current using a digital multimeter, voltmeter, and ammeter in a closed circuit.</p> <p>(3) To verify Ohm's law through experimental data.</p> <p>(4) To verify series and parallel circuits with resistors.</p> <p>(5) To verify current division and voltage division in series and parallel circuits.</p> <p>(6) To verify Kirchhoff's current law (KCL) through a series-parallel circuit.</p> <p>(7) To verify Kirchhoff's voltage law (KVL) through a series-parallel circuit.</p> <p>(8) To Measure the energy and power consumed by a resistor in a circuit using ammeter and voltmeter.</p> <p>(9) To make an extension board with at least three switches, a plug, a fuse, and an indicator.</p> <p>(10) To determine the frequency of ac mains using sonometer</p> <p><b>Note: Student will perform at least four experiments. The examiner will allot one practical at the time of end term examination.</b></p>	<p style="text-align: center;"><b>30</b></p>
<b>Suggested Evaluation Methods</b>		
<p><b>Internal Assessment:</b></p> <p>➤ <b>Theory</b></p> <ul style="list-style-type: none"> <li>• Class Participation: 4</li> <li>• Seminar/presentation/assignment/quiz/class test etc.: 4</li> <li>• Mid-Term Exam: 7</li> </ul> <p>➤ <b>Practicum</b></p> <ul style="list-style-type: none"> <li>• Class Participation: NA</li> <li>• Seminar/Demonstration/Viva-voce/Lab records etc.: 5</li> <li>• Mid-Term Exam: NA</li> </ul>	<p><b>End Term Examination:</b></p> <p>➤ <b>Theory</b></p> <ul style="list-style-type: none"> <li>• Written Examination: 35</li> </ul> <p>➤ <b>Practicum</b></p> <ul style="list-style-type: none"> <li>➤ Practical Examination: 20</li> </ul>	
<b>Learning Resources</b>		
<ol style="list-style-type: none"> <li>1. A Text book of Electrical Technology - B L Theraja, A K Theraja - S Chand &amp; Co.</li> <li>2. Fundamental of electric circuits-C. K. Alexander, M.N.O.Sadiku, Mcgraw hill.</li> <li>3. Fundamentals of electric circuit theory-D. Chattopadhyay, P.C. Rakshit, S. Chand.</li> </ol>		

**Ch. Ranbir Singh University, Jind Undergraduate Programs**  
**Skill Enhancement Course (SEC)**

<b>Part A - Introduction</b>			
Subject	Physics		
Semester	2nd		
Name of the Course	Physics Laboratory Skill Enhancement		
Course Code	PHY-SEC-227		
Course Type: (CC/MCC/MDC/CC-M/ DSEC /VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	NA		
Course Learning Outcomes(CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> <li>1. Learning measuring devices like Vernier callipers, Screw gauge, spherometer, micro-meter, travelling microscope and Sextant for measuring various length scales.</li> <li>2. Developing mechanical skill such as casting, foundry, machining, forming and welding and will become familiar with common machine tools like lathe, shaper, drilling, milling, surface machines and Cutting tools.</li> <li>3. Acquiring optical skills that will be helpful in healthcare and automobiles.</li> <li>4. Obtain skills in the usage of multi-meters and electric measuring devices, soldering of electrical circuits, oscilloscopes, power supplies and relays..</li> </ol> <hr style="width: 20%; margin-left: auto; margin-right: auto;"/> <ol style="list-style-type: none"> <li>5. Learn to present observations, results, analysis and different concepts related to Physics Laboratory Skill</li> </ol>		
Credits	Theory	Practical	Total
	2	1	3

Contact Hours	2	2	4
<b>Max. Marks:75</b> <b>Internal Assessment Marks:20</b> <b>End Term Exam Marks:55</b>		<b>Time:3hrs</b>	
<b>Part B- Contents of the Course</b>			
<b><u>Instructions for Paper- Setter</u></b>			
<p>1. Nine questions will be set in total.</p> <p>2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.</p> <p>3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.</p>			
Unit	Topics		Contact Hours
I	<b>Units and Dimensions</b> – Physical quantities – fundamental (mass, length and time) and derived. Need of measurement, fundamental and derived units, system of units, measuring process. SI and CGS system of units, Measuring devices: Vernier calliper, Screw gauge, spherometer, micro-meter, spectrometer and travelling microscope. Measurement of the dimensions of a solid block, volume of a cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.		7
II	<b>Mechanical Skills:</b> Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy and wood.		8
III	<b>Optical Skills:</b> Optical devices – mirrors, lenses, prism, grating, telescope, microscope and polarimeter, their theory viz. focal length, refractive index, dispersive power and resolving power etc., applications of optical devices in automobiles and healthcare, basics of an optical camera.		7
IV	<b>Electrical and Electronic Skills:</b> Idea of passive electrical components - resistor, capacitor and inductor and active electronic components – diode, transistor and ICs, Use of ammeter, voltmeter, galvanometer and multi-meter. Soldering of electrical circuits having discrete components R, L, C, diode, transistor and ICs on PCB. Operation of cathode ray oscilloscope. Making regulated power supply. Timer circuit, electronic switch using transistor and relay.		8
	<b><u>Practicum</u></b> 1. Comparison of diameter of a thin wire using screw gauge and travelling microscope. 2. To find the height/area of a distant object using sextant.		30



**Ch. Ranbir Singh University, Jind**  
**Undergraduate Programs**  
**Course: SEC-3**

<b>Part A - Introduction</b>			
Subject	Physics		
Semester	3rd		
Name of the Course	<b>Basic Instrumentation Skills</b>		
Course Code	PHY-SEC-329		
Course Type: (CC/MCC/MDC/CC-M/ DSEC /VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	NA		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> <li>1. Understand the necessary working knowledge on accuracy, precision, resolution, range and errors/uncertainty in measurements.</li> <li>2. Explanation of the specifications of Multimeter &amp; its uses.</li> <li>3. Understand the electric &amp; electronics instruments..</li> <li>4. Learn about the solar cell &amp; solar panel.</li> </ol>		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
<b>Max. Marks:75</b> <b>Internal Assessment Marks:20</b> <b>End Term Exam Marks:55</b>		<b>Time:3hrs</b>	
<b>Part B-Contents of the Course</b>			

**Instructions for Paper- Setter**

1. Nine questions will be set in total.
2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.
3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	<p><b>Basic of Measurements:</b> Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects, Voltmeter, Ammeter.</p> <p><b>Multimeter:</b> Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.</p>	8
II	<p><b>Electrical Instruments:</b> Different types of conductors and cables, Voltage drop and losses across cables and conductors. Insulation. Solid and stranded cable. Resistance, Inductor, Capacitor, Transformer, Basics of wiring-Star and delta connection. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources</p>	9
III	<p><b>Electronic Instruments:</b> PN junction diode, Zenor Diode, LEDs, Solar Cell, Photocell, Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Transistors, Rectifiers. Filter Circuits (Qualitative ideas only)</p>	7
IV	<p><b>Solar Energy:</b> Solar Energy-Key features, its importance, Merits &amp; demerits of solar energy, Applications of solar energy, Conversion of Solar energy into Electricity - Photovoltaic Effect, photovoltaic cell and its working principle, Different types of Solar cells, Series and parallel connections, Photovoltaic applications: Battery chargers, Load Calculation &amp; Cost Calculation for installing Solar Panels, Domestic electricity, Solar Subsidy Schemes</p>	6
	<p><b><u>Practicum</u></b></p> <ol style="list-style-type: none"> <li>1. Use of Multimeter for measuring Resistance, A.C. and D.C. Voltage and Current, checking of electrical fuses.</li> <li>2. Use of Multimeter to check the working condition of diode, an LED, a resistor and a capacitor.</li> <li>3. To measure the resistances in series and parallel using multimeter.</li> <li>4. To determine the resistivity of different wires by plotting a graph for potential difference versus current.</li> <li>5. To verify Ohm's law for metallic conductor and to determine its resistance.</li> <li>6. To study V-I characteristic of a diode.</li> <li>7. To study the voltage regulation characteristics of Zenor diode</li> </ol>	30

