উত্তরবঙ্গ কৃষি বিশ্ববিদ্যালয়
পুণ্ডিবাড়ী, কোচবিহার , পশ্চিমবঙ্গ-৭৩৬১৬৫
UTTAR BANGA KRISHI VISWAVIDYALAYA
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NOTICE INVITING TENDER (NIT)

Online Tenders are being invited under Two Bid System viz, Part-I Technical Bid and Part II Financial Bid from the intending reputed, bona-fide and experienced manufacturers /authorized dealers for supply and installation of Electrical Gadget and Instruments for Electrical Laboratory of Faculty of Technology at Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal-736165 as per following specification.

Details specification of Electrical Gadget and Instruments

Sl. No.	Item & Specification	Qty.
1.	**To measure the power requirement and power factor in an AC single-phase series RLC circuit.** **Power Supply:** Variable single-phase AC power supply, 0–230 V AC, 5 A, with minimum interlocking protection, overload and short-circuit protection, ON/OFF control and power indication – 1 No.; **Analog Voltmeter:** 0–300 V AC, analog type, Class 1.5, panel-mount, 96 × 96 mm – 1 No.; **Analog Ammeter:** 0–5 A AC, analog type, Class 1.5, panel-mount, 96 × 96 mm – 1 No.; **Wattmeter:** 230 V / 5 A, 1200 W, AC analog type, panel-mount, 96 × 96 mm – 1 No.; **Power Factor Meter:** 230 V / 5 A, AC analog type, panel-mount, 96 × 96 mm – 1 No.; **Resistor (R):** 76 Ω / 3 A, high-wattage, panel-mount type, suitable for continuous laboratory operation – 2 Nos.; **Inductor (L):** 250–500 mH, step-variable, panel-mount type – 1 No.; **Capacitor (C):** 4–10 µF / 440 V AC, selectable/step-variable, panel-mount type – 1 No.; **Connection System:** All external connections shall be made through suitably rated 4 mm banana jacks, clearly identified and compatible with the supplied patch cords; **Panel Construction:** All meters, R, L, C components, switches, indicators and controls shall be mounted on a rigid Bakelite/Class "F" insulation panel board with clear resolution/printed markings, and the complete assembly shall be housed in a robust MS powder-coated panel box and stand; **Transparent Rear Cover:** The rear side shall be covered with a transparent protective sheet/enclosure so that internal wiring and connections can be visually inspected by authorized personnel while preventing students from directly accessing live connections; **Front Panel Arrangement:** All meters, switches, supply controls, MCBs, indicators, terminals and circuit components shall be accessible from the front panel, with each component clearly labelled with its name, rating and terminal identification; **Protection:** The system shall include suitable MCB/fuse protection, overload protection, short-circuit protection, electrical isolation and minimum interlocking arrangement to prevent unsafe energization; **Indication:** Suitable power ON/OFF indicating lamps shall be provided on the front panel with clearly marked control switches; **Terminal Arrangement:** All terminals of the power supply, voltmeter, ammeter, wattmeter, power-factor meter, resistor, inductor and capacitor shall be brought out on the front panel for flexible circuit configuration; **Wiring & Ferrule Identification:** All internal wiring shall be neatly routed, properly	1

	insulated and securely terminated, with each connection provided with clear ferrule numbering and terminal identification corresponding to the circuit diagram; **Circuit Diagram:** Complete and clearly labelled circuit diagrams for single-phase series R, RL, RC and RLC circuits shall be permanently provided on the front panel; **Patch Cords & Multi-Jacks:** Suitable ISO-make wires, 4 mm banana plug patch cords and multi-jack connectors shall be supplied for flexible laboratory connections; **Measurement Facility:** The panel shall permit simultaneous measurement of supply voltage, circuit current, real power and power factor for the connected series RLC circuit; **RLC Configuration:** The arrangement shall permit convenient selection and variation of resistance, inductance and capacitance for studying different operating conditions of the AC series RLC circuit; **Power & Power Factor Measurement:** The system shall be suitable for determining input power requirement, power factor, impedance, phase relationship and other electrical characteristics of the single-phase series RLC circuit; **Automatic Cooling:** The panel shall incorporate an automatic cooling system that operates when the internal/panel temperature exceeds approximately 40°C, with suitable ventilation for heat-producing components; **Mobility:** The complete assembly shall be mounted on a robust powder-coated MS stand with trolley/castor wheels for easy movement within the laboratory; **Safety & Earthing:** All live terminals shall be suitably insulated/recessed and clearly identified, and proper earthing shall be provided for the metallic enclosure, panel box and supporting structure; **Documentation:** The complete system shall be supplied with circuit diagrams, wiring diagrams, terminal/ferrule identification chart, operating manual/instructions, safety instructions, test/inspection certificate and all necessary accessories. **List of Experiments:**- 1. To measure the power requirement and power factor in an AC single-phase series RLC circuit. 2. To measure the voltage, current, input power and power factor of a single-phase series RLC circuit. 3. To determine the impedance and phase angle of a series RLC circuit from measured values. 4. To study the effect of varying resistance, inductance and capacitance on circuit current and power factor. 5. To determine the resonant condition of a series RLC circuit. 6. To study the variation of current, impedance and power factor with changes in circuit parameters. 7. To measure and compare the power requirement of R, RL, RC and RLC AC circuits. 8. To study the relationship between real power, apparent power and power factor in a single-phase AC circuit. 9. To observe the phase relationship between voltage and current under resistive, inductive and capacitive conditions. 10. To study the effect of capacitive and inductive reactance on the overall power factor of a series RLC circuit.	
2	**To measure energy of a single-phase AC circuit with the help of ammeter, voltmeter and power factor meter and energy meter.** **Power Supply:** Variable single-phase AC power supply, **0–230 V AC, 5 A**, with minimum interlocking protection, overload and short-circuit protection, ON/OFF control and power indication – **1 No.**; **Analog Voltmeter:** 0–300 V AC, analog type, Class 1.5, panel-mount, 96 × 96 mm – **1 No.**; **Analog Ammeter:** 0–5 A AC, analog type, Class 1.5, panel-mount, 96 × 96 mm – **1 No.**; **Wattmeter:** 230 V / 5 A, 1200 W, AC analog type, panel-mount, 96 × 96	1

	mm – **1 No.**; **Power Factor Meter:** 230 V / 5 A, AC analog type, panel-mount, 96 × 96 mm – **1 No.**; **Single-Phase Energy Meter:** 230 V AC, 50 Hz, single-phase, direct-connected type, suitable current rating of minimum 5 A or as required by the connected load, Class 1.0 accuracy or better, kWh measurement with clearly visible cumulative energy register/display, suitable for laboratory measurement and demonstration – **1 No.**; the energy meter shall be provided with accessible input/output terminals and suitable protection for safe connection and measurement; **Resistor (R):** 76 Ω / 3 A, high-wattage, panel-mount type, suitable for continuous laboratory operation – **2 Nos.**; **Inductor (L):** 250–500 mH, step-variable, panel-mount type – **1 No.**; **Capacitor (C):** 4–10 µF / 440 V AC, selectable/step-variable, panel-mount type – **1 No.**; **Connection System:** All external connections shall be made through suitably rated **4 mm banana jacks**, clearly identified and compatible with the supplied patch cords; **Panel Construction:** All meters, energy meter, R, L, C components, switches, indicators and controls shall be mounted on a rigid **Bakelite/Class "F" insulation panel board** with clear resolution/printed markings, and the complete assembly shall be housed in a robust MS powder-coated panel box and stand; **Transparent Rear Cover:** The rear side shall be covered with a transparent protective sheet/enclosure so that internal wiring and connections can be visually inspected by authorized personnel while preventing students from directly accessing live connections; **Front Panel Arrangement:** All measuring instruments, switches, supply controls, MCBs, indicators, energy meter terminals and circuit components shall be accessible from the front panel, with each component clearly labelled with its name, rating and terminal identification; **Protection:** The system shall include suitable MCB/fuse protection, overload protection, short-circuit protection, electrical isolation and minimum interlocking arrangement to prevent unsafe energization; **Indication:** Suitable power ON/OFF indicating lamps shall be provided on the front panel with clearly marked control switches; **Terminal Arrangement:** All terminals of the power supply, voltmeter, ammeter, wattmeter, power-factor meter, energy meter, resistor, inductor and capacitor shall be brought out on the front panel for flexible circuit configuration; **Wiring & Ferrule Identification:** All internal wiring shall be neatly routed, properly insulated and securely terminated, with each connection provided with clear ferrule numbering and terminal identification corresponding to the circuit diagram; **Circuit Diagram:** Complete and clearly labelled circuit diagrams for single-phase AC energy measurement, including suitable R, RL, RC and RLC load arrangements, shall be permanently provided on the front panel; **Patch Cords & Multi-Jacks:** Suitable ISO-make wires, 4 mm banana plug patch cords and multi-jack connectors shall be supplied for flexible laboratory connections; **Measurement Facility:** The panel shall permit simultaneous measurement of supply voltage, load current, real power, power factor and consumed electrical energy; **Energy Measurement Facility:** The arrangement shall allow students to record the energy meter reading over a known period and compare the measured energy with the calculated energy based on voltage, current, power factor and operating time; **RLC Configuration:** The arrangement shall permit convenient selection and variation of resistance, inductance and capacitance for studying energy consumption under different single-phase AC load conditions; **Power & Power Factor Measurement:** The system shall be suitable for determining input power, power factor, apparent power, impedance and energy consumption of the connected AC load; **Automatic Cooling:** The panel shall incorporate an automatic cooling system that operates when the internal/panel temperature exceeds approximately **40°C**, with suitable ventilation for heat-producing components; **Mobility:** The complete assembly shall be mounted on a robust powder-coated MS stand with trolley/castor wheels for easy movement within the laboratory; **Safety & Earthing:** All live terminals shall be suitably insulated/recessed and clearly identified, and proper earthing shall be provided for the metallic enclosure, panel box and supporting structure; **Documentation:** The complete system shall be supplied with circuit diagrams, wiring diagrams, terminal/ferrule	

	identification chart, operating manual/instructions, safety instructions, test/inspection certificate and all necessary accessories. LIST OF EXPERIMENTS:- ▪ To measure the **voltage, current, power factor and real power** of a single-phase AC load. ▪ To measure the **electrical energy consumed in kWh** using a single-phase energy meter. ▪ To calculate the energy consumption of the AC circuit from measured power, power factor and operating time and compare it with the energy-meter reading. ▪ To study the variation of **energy consumption with different load conditions**. ▪ To measure and compare energy consumption for **resistive, inductive and capacitive loads**. ▪ To study the effect of **power factor on current, power and energy consumption** of a single-phase AC circuit. ▪ To determine the relationship between **voltage, current, power factor, real power and electrical energy**. ▪ To study the energy consumption of **R, RL, RC and RLC loads** using the single-phase energy meter. ▪ To determine the approximate operating time required for a specified amount of electrical energy consumption under a given load condition. ▪ To compare the **calculated energy consumption with the measured energy-meter reading** and determine the percentage difference. ▪ To study the operation, terminal connections and basic working principle of a **single-phase AC energy meter**.	
3	**To measure the power consumption in a three-phase circuit using two-wattmeter method.** **Power Supply:** Variable three-phase AC power supply, **0–415 V AC, 5 A**, with minimum interlocking protection, overload and short-circuit protection, ON/OFF control and power indication – **1 No.** **Digital Voltmeter: 0–500 V AC**, digital type, panel-mount, 96 × 96 mm, with suitable volt-selector switch – **1 No.** **Digital Ammeter: 0–5 A AC**, digital type, panel-mount, 96 × 96 mm – **3 Nos.**, suitable for measuring the three line currents. **Digital Wattmeter: 415 V / 5 A, 1200 W**, AC digital type, panel-mount, 96 × 96 mm – **2 Nos.**, suitable for the Two-Wattmeter Method of three-phase power measurement. **Three-Phase Load: 415 V, 5 A/phase**, step-variable load with suitable short-circuit and overload protection, suitable for balanced and unbalanced load conditions – **1 Set**. **Measurement Arrangement:** The panel shall be suitable for measuring three-phase line voltage, all three line currents and the two wattmeter readings simultaneously, enabling calculation of total three-phase active power using the Two-Wattmeter Method. **Power Factor Measurement:** The arrangement shall permit determination of the load power factor from the two wattmeter readings and comparison with the observed electrical parameters. **Panel Construction:** All meter mountings and fittings shall be installed on a rigid **Class "F" insulation panel board** with clear resolution/printed markings. The complete assembly shall be housed in a robust **MS powder-coated panel box and stand** and trolley-mounted for easy movement. **Automatic Cooling:** The panel shall incorporate an **automatic cooling system** which operates when the internal/panel temperature exceeds approximately **40°C**, with suitable ventilation for continuous laboratory operation. **Protection:** Suitable **MCB/fuse protection, overload protection, short-circuit protection, electrical isolation and minimum interlocking**	1

protection shall be provided for safe operation.
Indication & Controls: Suitable power ON/OFF indicators, control switches and protection indicators shall be provided on the front panel and clearly labelled.
Terminal Arrangement: All terminals of the three-phase power supply, voltmeter, three ammeters, two wattmeters and load shall be brought out on the front panel for flexible connections.
Wiring & Ferrule Numbering: All internal connections shall be neatly routed, properly insulated and securely terminated. All connections shall have clear **ferrule numbering and terminal identification**, corresponding to the circuit diagram.
Circuit Diagram: A complete and clearly labelled **Two-Wattmeter Method circuit diagram** shall be permanently provided on the front panel, including supply, load, voltage connections and current-coil connections of both wattmeters.
Patch Cords & Multi-Jacks: Suitable **ISO-make wires, patch cords and multi-jack connectors** shall be supplied for flexible laboratory connections.
Connection System: All terminals shall be suitably rated, clearly marked and compatible with the supplied patch cords and multi-jack connectors.
Load Configuration: The step-variable load shall permit suitable variation of the three-phase load for studying different operating conditions, including balanced and, where applicable, unbalanced loads.
Front Panel Arrangement: All meters, switches, indicators, MCBs, terminals and load-control points shall be accessible from the front panel and clearly labelled with their ratings and functions.
Anti-Vibration Arrangement: The bottom portion of the panel/stand shall be fitted with suitable anti-vibration pads to improve stability during operation.
Safety & Earthing: All live terminals shall be suitably insulated/recessed and clearly identified. Proper earthing shall be provided for the metallic panel enclosure, stand and associated equipment.
Documentation: The complete system shall be supplied with circuit diagrams, wiring diagrams, terminal/ferrule identification chart, operating manual/instructions, safety instructions, test/inspection certificate and all necessary accessories.

LIST OF EXPERIMENTS:-

1. **To measure the total power consumption of a three-phase AC circuit using the Two-Wattmeter Method.**
2. To measure the **line voltage and three line currents** of a three-phase load.
3. To measure the readings of the **two wattmeters** connected according to the Two-Wattmeter Method.
4. To calculate the **total three-phase active power** from the two wattmeter readings.
5. To determine the **power factor of a three-phase load** using the Two-Wattmeter Method.
6. To study the effect of **load variation on three-phase power consumption**.
7. To study the Two-Wattmeter Method under **balanced three-phase load conditions**.
8. To study the behaviour of the two wattmeter readings at different **power-factor conditions**.
9. To observe the variation of wattmeter readings for **lagging and near-unity power-factor loads**.
10. To compare the calculated three-phase power with the measured wattmeter values and determine the **percentage error/difference**.
11. To study the relationship between **line voltage, line current, power, power factor and load** in a three-phase AC circuit.

To verify the practical application of the **Two-Wattmeter Method for**

	three-phase power measurement.	
4	**To prepare a DC power supply unit using diode and filter circuit.** **Input supply:** 230 V AC, 50 Hz **Transformer:** Step-down transformer, 230 V AC to 12 V AC **Rectifier:** Silicon PN-junction diode bridge (4 diodes) **Diode rating:** Minimum 1 A, 50 V PIV per diode **Filter:** Electrolytic capacitor filter **Filter capacitor:** 1000 µF, 25 V **Output voltage:** Approximately 12–15 V DC (unregulated, depending on load and transformer rating)	1
5	**To study the Zener diode as voltage regulator circuit.** **Input supply:** 9–15 V DC variable supply **Zener diode:** 1N4733A or equivalent **Zener voltage:** Approximately 5.1 V **Zener power rating:** 1 W **Series resistor:** 330 Ω, 1/2 W **Load resistor:** 1 kΩ, 1/2 W **Input voltage range:** 9–15 V DC **Regulated output voltage:** Approximately 5.1 V DC **Measuring instruments:** DC voltmeter and ammeter	2

6	**To study transistor characteristics in CE configurations.**
	
	Specifications:-
	
	• **Transistor:** NPN transistor, BC547 or equivalent
	• **Configuration:** Common Emitter (CE)
	• **Input supply:** 0–12 V DC variable supply
	• **Base resistor:** 10 kΩ, 1/4 W
	• **Collector resistor:** 1 kΩ, 1/4 W
	• **Input voltage range (V_BE):** 0–1 V DC
	• **Collector-emitter voltage (V_CE):** 0–12 V DC
	• **Input current (I_B):** Measured in µA
	• **Output current (I_C):** Measured in mA
	• **Measuring instruments:** DC voltmeters and microammeter/milliammeter
	• **Characteristics studied:**
	  ○ Input characteristic: (I_B) versus (V_{BE}) at constant (V_{CE})
	  ○ Output characteristic: (I_C) versus (V_{CE}) at constant (I_B)
		2

7	**To verify different logic gates.** **Specifications:-** **Digital Trainer Kit:** AE/DTK-02; **Power Supply:** Built-in power supply with +5 V variable DC and +12 V variable DC supply; **Digital Inputs:** 10 independent digital input switches with LED indication; **Digital Outputs:** 10 LED-indicated digital output terminals; **Clock/Frequency Source:** Built-in fixed clock frequencies from 1 Hz to 1 MHz; **Pulse Generators:** 2 push-to-ON pulsars; **Breadboard:** Built-in solderless breadboard for circuit connections; **Display:** Dual seven-segment display; **BCD Section:** Built-in BCD inputs; **Logic Levels:** Logic 0 and Logic 1; **Connections:** Patch cords/jumper wires; **Output Indication:** LED-based digital output indication; **Gates:** AND, OR, NOT, NAND, NOR, XOR and XNOR. **Purpose:** To study and verify the truth tables and logical operation of different logic gates using the digital trainer kit. Input Construction:-All components fixed on a high insulation board with high resolution print and brought out all terminal. Board mounted in a laminated front panel with ms powder coated box and patch and manual are provide with the kit. Dimensions (approx.) 450mm x 280mm x 150mm **List of Experiments**	2

	1. To verify the AND gate. 2. To verify the OR gate. 3. To verify the NOT gate. 4. To verify the NAND gate. 5. To verify the NOR gate. 6. To verify the XOR gate. 7. To verify the XNOR gate. 8. To verify the truth tables of different logic gates. 9. To study the universal gates NAND and NOR. To implement basic logic gates using universal gates.	
8	**To measure unknown resistance using Wheatstone bridge.** **Specifications** **Apparatus:** Wheatstone Bridge experimental trainer kit; **Power Supply:** 5 V DC; **Bridge Type:** Four-arm Wheatstone bridge; **Ratio Arms:** P and Q with selectable resistance values; **Resistance P:** 10 Ω, 100 Ω and 1 kΩ; **Resistance Q:** 1 kΩ, 10 kΩ and 100 Ω; **Unknown Resistance Arm:** R with selectable resistance positions; **Variable Resistance:** S, 10 kΩ variable resistor for obtaining bridge balance; **Detector:** Built-in galvanometer/null detector; **Display:** Digital display for measurement/indication; **Terminals:** Banana-type connection terminals; **Connection:** Patch cords connecting the bridge arms, power supply and galvanometer; **Supply Voltage:** 5 V DC; **Measurement Principle:** Null-balance method; **Balance Condition:** At balance, no current flows through the galvanometer; **Calculation:** Unknown resistance is determined from the Wheatstone bridge balance relation (R_x = \frac{Q}{P}S), according to the selected ratio arms; **Purpose:** To determine the value of an unknown resistance accurately by balancing the Wheatstone bridge and observing the null condition of the galvanometer. **List of Experiments** 1. To measure an unknown resistance using a Wheatstone bridge. 2. To study the working principle of a Wheatstone bridge. 3. To verify the balance condition of a Wheatstone bridge. 4. To determine an unknown resistance using different ratio-arm combinations. 5. To study the effect of varying the resistance ratio (P/Q) on bridge balance. 6. To determine the unknown resistance using the null-balance method. 7. To compare the measured value of unknown resistance with its nominal/standard value. 8. To study the use of a galvanometer as a null detector in a Wheatstone bridge. 9. To investigate the sensitivity of the Wheatstone bridge for different resistance combinations. 10. To calculate the percentage error between the measured and standard resistance values.	1
9	**To study different parts of DC/AC machines.** **Specifications** **Experiment:** To study and identify the different parts of a DC machine; **Machine Type:** DC motor/DC generator; **Construction:** Rotating armature type with stationary field system; **Frame/Yoke:** Provides mechanical support and magnetic path; **Poles:** Pole core and pole shoe for producing and distributing the magnetic field; **Field Winding:** Insulated copper winding used	1

	to produce the main magnetic field; **Armature Core:** Laminated steel core mounted on the shaft to reduce eddy-current losses; **Armature Winding:** Conductors placed in the armature slots for electromagnetic energy conversion; **Commutator:** Segmented copper mechanical rectifier connected to the armature winding; **Brushes:** Carbon/graphite brushes for transferring current between the stationary and rotating circuits; **Brush Holder:** Holds the brushes in proper contact with the commutator; **Shaft:** Transmits mechanical power and supports the rotating armature; **Bearings:** Support the shaft and provide smooth rotation; **End Covers/End Shields:** Provide mechanical support and protect internal components; **Cooling Fan/Ventilation:** Removes heat generated during operation; **Terminal Box:** Provides electrical connections to the armature and field windings; **Nameplate:** Indicates rated voltage, current, power, speed and other machine ratings; **Machine Parts Studied:** Yoke, poles, pole shoes, field winding, armature core, armature winding, commutator, brushes, brush holders, shaft, bearings, end covers and cooling arrangement; **Purpose:** To study the construction, identify the different components and understand the function of each part of a DC machine. **List of Experiments** 1. To identify and study the different parts of a DC machine. 2. To study the construction and working principle of a **DC motor**. 3. To study the construction and working principle of a **DC generator**. 4. To study the construction and function of the **yoke/frame**. 5. To study the construction and function of **pole core and pole shoe**. 6. To study the **field winding** and its function in a DC machine. 7. To study the construction of the **armature core and armature winding**. 8. To study the construction and function of the **commutator**. 9. To study the construction and function of **carbon brushes and brush holders**. 10. To study the function of the **shaft, bearings and end covers**. 11. To study the **cooling and ventilation arrangement** of a DC machine. 12. To identify the **armature and field terminals** of a DC machine. 13. To study the **nameplate ratings** and specifications of a DC machine. 14. To identify the electrical and mechanical components and understand their individual functions. 15. To compare the construction and applications of **DC motors and DC generators**.	
10	**To perform open circuit test on a single phase transformer and determine its iron loss as well as open circuit parameters.** **Technical Specifications:-** **Transformer:** 1 KVA, single-phase, 50 Hz, air-cooled type, ISO make. **Transformer Primary:** 230 V AC. **Transformer Secondary:** 115 V AC. **Variac:** Single-phase, panel-mount type, 0–250 V AC, 10 A, ISO make, with zero-position interlocking protection – **1 No.** **Voltmeter:** 0–300 V AC, panel type, 96 × 96 mm, ISO make – **2 Nos.** **Voltmeter:** 0–150 V AC, panel type, 96 × 96 mm, ISO make – **1 No.** **Wattmeter:** Digital panel-mount type, 250 V / 10 A, 96 × 96 mm – **1 No.** **Ammeter:** 0–5 A AC, panel type, 96 × 96 mm – **1 No.** **Ammeter:** 0–10 A AC, panel type, 96 × 96 mm – **1 No.** **Load:** 0–1000 W / 250 V bulb load, complete set – **1 Set.** **Transformer Winding Temperature Protection:** Digital temperature indicator with suitable thermocouple – **1 No.** **Automatic Cooling:** The panel shall be provided with an automatic cooling system, which shall operate when the internal/panel temperature exceeds **40°C**. **Front Panel:** All meters, switches, MCBs, indicators and control components shall be mounted on a rigid **Class "F" insulation panel board** with suitable resolution/printed markings.	1

	Panel Enclosure: Complete assembly shall be housed in a robust **MS powder-coated panel box**, with the rear side suitably covered by a transparent protective sheet to make internal connections visible to students. **Terminal Arrangement:** All terminals of the transformer, meters, Variac and other components shall be brought out to the front panel for easy and flexible student connections. **Flexible Connections:** All terminals shall be compatible with standard patch cords and multi-jack connections. **Patch Cords:** Suitable connecting patch cords and multi-jacks shall be provided; wires shall be of good-quality ISO-marked make. **Protection & Control:** MCBs, ON/OFF switches, indicating lamps and necessary protection devices shall be provided on the front panel. **Circuit Diagram:** Complete circuit diagrams shall be permanently printed/drawn on the front panel for student reference and practical operation. **Ferrule Numbering:** All internal wiring shall have proper identification using **ferrule numbering**, matching the circuit diagram and terminal markings. **Internal Wiring:** All internal connections shall be neatly routed, properly terminated and clearly marked for easy inspection and maintenance. **Safety:** Suitable electrical protection, insulation, earthing and isolation arrangements shall be provided for safe operation during student laboratory experiments. **Mobility:** The complete panel shall be mounted on a robust **powder-coated MS stand with trolley/castor wheels** for easy movement. **Visibility:** Component terminals, connection points and relevant wiring shall remain clearly visible to students while maintaining necessary electrical safety. **Construction:** All meters, controls, fittings and accessories shall be securely mounted and suitable for continuous laboratory training use. **Documentation:** A complete wiring/circuit diagram, terminal identification chart and basic operating instructions shall be provided along with the unit. **LIST OF EXPERIMENTS:-** 1. Open Circuit (OC) Test 2. Short Circuit (SC) Test 3. Efficiency Calculation 4. Polarity Test 5. Safety Precautions and Error Analysis.	
11	**To perform short circuit test on a single phase transformer and hence find copper loss, equivalent circuit parameters, voltage regulation and efficiency.** **Technical Specifications:** Transformer: 1 KVA, Primary 230 V, Secondary 115 V, single phase, 50 Hz, normally air-cooled (ISO make) – 1 No.; Variac: single phase, panel-mount type, 0–250 V, 10 A, ISO make, with zero-position interlocking protection – 1 No.; Voltmeter: 0–300 V AC, panel type, 96 × 96 mm, ISO make – 2 Nos., and 0–150 V AC, panel type, 96 × 96 mm, ISO make – 1 N o.; Wattmeter: 250 V/10 A, digital type, panel-mount, 96 × 96 mm – 1 No.; Ammeter: 0–5 A AC, panel type, 96 × 96 mm – 1 No., and 0–10 A AC, panel type, 96 × 96 mm – 1 No.; Transformer winding temperature protection: digital temperature indicator with suitable thermocouple – 1 No.; all meters shall be mounted on a front Bakelite/Class “F” insulation panel with a robust MS powder-coated box, and the rear side shall be covered with a transparent protective sheet to make the connections visible to students; all terminals of the transformer, meters, Variac, load and other associated components shall be brought out on the front panel for flexible connections; MCBs, indicating lamps, switches and necessary protection devices shall be provided on the front of the panel; all terminals shall be compatible with suitable patch cords and multi-jack connections; connecting patch cords and multi-jacks shall be provided and shall be made of good-quality ISO-marked wire/components; complete circuit diagrams shall be clearly printed on the front panel; all inbuilt connections shall have proper identification markings and ferrule numbering	

	corresponding to the circuit diagrams and terminal numbers; the complete panel shall be mounted on a sturdy powder-coated MS stand with trolley/castor wheels for easy movement; an automatic cooling system shall be provided and shall operate when the panel/internal temperature exceeds approximately 40°C; suitable ventilation, electrical protection and earthing arrangements shall be provided for safe laboratory operation; all meter mountings, fittings and accessories shall be securely installed and suitable for continuous student training and practical use; **List of Experiments:** 1. Open Circuit (OC) Test of Single-Phase Transformer 2. Short Circuit (SC) Test of Single-Phase Transformer, Polarity Test of a Single-Phase Transformer, Separation of Core Losses 3. Determination of Voltage Regulation, Measurement of Primary and Secondary Voltage and Current. 4. Transformer Performance Under Load, Observation and Measurement of Transformer Winding Temperature. Study of Transformer No-Load and Loaded Conditions, and Demonstration of Safe Transformer Testing Procedures.	

➢ Tender Schedule:

•	Date of Online Publication	:	06/11/2026
•	Starting Date of online upload & submission	:	06/11/2026
•	Last date of online bid submission	:	25/11/2026
•	Last date of EMD submission (Hard copy)	:	26/11/2026
•	Opening date of Technical bids	:	27/11/2026
•	Tender fee	:	Nil
•	EMD	:	₹9,500.00 (Rupees Nine Thousands five Hundred) only for all items and @2.5 % of quoted value for a single/partial item by means of demand draft from any Indian Commercial Bank in favour of *Uttar Banga Krishi Viswavidyalaya payable at Cooch Behar.*
•	EMD Exemption	:	MSME, SSI & NSIC certified bidders may be exempted. Subject to submission of Valid such exemption certificate
•	Details available in the website	:	https://wbtenders.gov.in/www.ubkv.ac.in

1. General Instructions:
In the event of e-tendering, intending bidder may download the tender documents from the website: http://wbtenders.gov.in directly with the help of Digital Signature Certificate (DSC)

2. Submission of bids:
Both Technical bid and Financial Bid are to be submitted concurrently duly digitally signed by the Authorized Company personnel who is in the pay roll of the Company in the website http:// wbtenders.gov.in. All papers must be submitted in English language.

3. ***Warranty: 2 (Two) years from the date of installation or as specified above in technical specifications.***

4. Eligibility for Quoting:

- Original Equipment Manufacturers (OEM) or Dealers/Distributors/Agents duly authorized by the manufacturers who are able to supply the assured quantities as per requirement & have requisite qualification for meeting the requirements as per this tender are only eligible for quoting.
- Further, vendors who were declared black listed and/or insolvent by any Govt. Concern/any Institutions in the Country for particular item or items are not eligible to participate in the current tender for that item or items.
- Integrity Pact Declaration:

i) Bidder should not offer any benefit to the employees of the University and also not sold to commit any offence under Prevention of Corruption Act, 1988 or Indian Penal Code 1860;
ii) Bidder should not enter into any undisclosed agreement or Understanding with other bidders with respect to prices, specifications, certifications, Subsidiary contracts, etc.

iii) Undertaking (as part of Fall Clause) is to be given by the bidders that he has not and will not sell the same material/equipment at prices lower than the bid price;

It is needed to mention that the University will have the right to take punitive actions for any violation on behalf of the Chancellor.

5. Annual Turnover Requirements:

Vender having average annual Turn Over more than Rs.30 (thirty) Lakh in India for last three financial years 2023-24, 2024-25 & 2025-26 are eligible to participate in the Tender.

6. Submission of Tenders

6.1 General process of submission

Tenders are to be submitted online through the website stated in Clause 1. All the documents including addendum/ Corrigendum related to the tender uploaded by the Tender Inviting Authority form an integral part of the contract. Tenderers are required to upload all the tender documents along with the other documents, as asked for in the tender, through the above website within the stipulated date and time as given in the Tender. Tenders are to be submitted in two folders at a time, one is Technical Bid and the other is Financial Bid. The tenderer shall carefully go through the notice and prepare the required documents and upload the scanned documents of originals in Portable Document Format (PDF) to the portal in the designated locations/folders of Technical Bid. He needs to fill up the active cell at BOQ and upload the same in designated location of Financial Bid. The documents uploaded are virus scanned and digitally signed using the Digital Signature Certificate (DSC). Tenderers should in general upload the latest documents as part of the tender, however, in case of failure in uploading such documents, it will be deemed that they (tenderers) have taken acceptant of such latest documents including addendum/corrigendum, if published till the bid submission ends.

6.2 Technical Bid

The Technical Bid should contain scanned copies and/or declarations in the following standardized formats in two covers (folders):

I. Technical File (Statutory Cover) containing:

a) Technical details of the Items Quoted "Bidders" must submit Technical specification along with Catalogue of the item quoted in “Technical Details” Folders.

b) Audited Annual Accounts for last three financial years 2023-24, 2024-25 & 2025-26 or during the period since formation of the Firm, if it was set up in less than such 3- year period. Bidders whose accounts are not audited must submit 26AS for the above years as available in the official website of the Income Tax Department, Government of India. (to be submitted in “Accounts” folder)

II. My Document (Non-Statutory Cover) containing as follows:

Sl. No.	Category	Sub-Category	Sub-Category Description
1	Certificates	Certificates	Aadhaar Linked PAN Card of the Bidder
			Aadhaar card of the Bidder
			GST Registration Certificate
2	Company Details	Company Details	Trade License/Enlistment Certificate
			Registration with Registrar of Companies
			Memorandum of Articles for Limited Companies.
3	Credential	Credential 1	a) Copy of the purchase order with compliance certificate for supplying similar nature of items at least 2 years in an Institute of Higher Education b) Brief User list preferably for user in West Bengal in an Institute of Higher Education
4	Financial Information	Payment Certificate 1	Income Tax Returns submitted for the Financial year (2023-24), (2024-25) & (2025-26)
			GST Return for last 3 months in 2026-27

5	Product Catalogue(Coloured)		Mandatory
6	Compliance Statement		Mandatory

6.3 Financial Bid

The Financial Bid should contain the following document in one cover (folder):

Bill of Quantities (BOQ): The tenderer should fill-up the designated cell as marked by the University in the BOQ sheet.

(** All the required essential / optional accessories or incidental services should be mentioned in the hard copy of Financial Bid)

7. Evaluation of the tenders

During the tender evaluation process, the "Technical Bid" will be opened first. Those Bidders who are qualified in respect of the essential & other requirements in "Technical Bid" will be identified and their financial bid will be opened. The financial bid of those Tenderer failing to meet the technical specification & other requirements laid down in the tender notice will not be opened and be rejected. The Tenderer offering the item found suitable and as per the tender specifications will only be selected. Final selection of the bidder in respect of Financial Bid is subject to further verification of several parameters allied with Financial Bid Evaluation.

8. Opening of financial bid:-

i) Financial bid can be seen & accessed by the bidder through the NIC Portal after opening of financial bid on line. Objections raised by any Bidder in this respect will not be entertained by the University. No informal tender will be entertained in the Bid further.

ii) During the scrutiny, if it comes to the notice of the tender inviting authority that the credential or any other paper found incorrect/ manufactured/ fabricated, that bidder would not be allowed to participate in the tender and that application will be rejected outright without any prejudice.

iii) The Tender Selection Committee reserves the right to cancel the N.I.T. due to any unavoidable Circumstances and no claim in this respect will be entertained.

9. TERMS & CONDITIONS REGARDING PURCHASE POLICY OF TENDERING AUTHORITY:

9.1 Bid Information:

a) Bidder may quote in Currency as available in the BOQ Sheet.

b) The rate quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.

c) Bidder must follow the instruction for filling up BOQ as per Clause 6.3.

d) Partial Tender/Incomplete tenders both for Technical and Commercial aspects may subject to cancellation of tender. However, University Authority will define the Partial Tender/Incomplete Tender based on the tender evaluation status.

9.2 Evaluation of Quotation: The Purchaser will evaluate and compare the quotations determined to be substantially responsive stage wise. Firstly, Technical Bid will be evaluated and thereafter Price Bid for technically qualified bidders will be evaluated for selection of vender.

9.3 Award of Contract: The purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive both technically and commercially. Purchaser reserves the right to reject any or all the tender, wholly or partly, without assigning any reason thereof and shall not be bound to accept the lowest bid.

9.4 Successful Bidder will have to sign an agreement with the competent authority of the University for supply of any item of ordered value ₹2.5 Lakh and above.

9.5 The vendor should quote and be capable to complete the supply and installation as per Tender.

9.6 Adequate support service facility: The bidder/manufacturer should have adequate service support Centre in West Bengal basis for any emergency breakdown/fault offering facility within 48 hours and should be agreeable to provide AMC facility after the warranty period.

9.7 Statutory deduction for GST and other Government taxes in the hand of the payee will be made as per the law in force.

9.8 **Delivery Time Schedule**: **The Supply, Construction, Fabrication and installation /Demonstration work must be completed within 60 days from the date of receipt of the work order. No material will accepted in weekly off day and scheduled holiday of the University.**

9.9 Validity of offer: A bidder should spell out in the tender that it shall remain valid for a minimum period of 180 days from the date of opening of the tender and during this period, the bidder shall not be entitled to revoke or cancel its offer.

9.10 Place of Supply: Faculty of Technology, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal-736165

9.11 Payment Schedule: 100% Payment will be made after satisfactory supply and installation of the equipment. This is jointly certified by the competent authority of the University and OEM's Service Engineer.

9.12 Quantity Changeability: Quantity as stated in the tender document may be changed at the time of issuing purchase order due to the fund crunch or for other valid reasons.

9.13 Liquidated Damages: If the supplier fails to deliver and installation of equipment within the time frame(s) incorporated in the work order, the purchaser / consignee shall, without prejudice to other rights and remedies available to the purchaser / consignee under the work order, deduct from the order price, as liquidated damages, a some equivalent to 2% per month (pert of a month to be taken as one month) of delay or pert thereof on delayed supply of equipment until actual delivery or performance subject to a maximum of 10% of the order value. Once the maximum is reached purchaser/ consignee may consider termination of the order perform herein. During the above mentioned period of supply and / or performance, the conditions incorporated herein shall also apply.

9.14 Force Majeure: In case of performance disruption due to natural disasters (like earthquakes, hurricanes, floods etc.), wars riots or other major upheaval, performance failures of parties outside our control (e.g. telephone service, labour action in our vendors'/service providers etc.), second party will not be held liable.

In the event of any dispute between UTTAR BANGA KRISHI VISWAVIDYALAYA and second party arises; it can be mutually resolved by the way of amicable settlement between them. In case, the dispute is not resolved amicably, either of them, it shall be settled by a Board of Arbitration consisting of 3 members of which one member shall be nominated by the Hon'ble Vice-Chancellor, one member to be nominated by second party and third member shall be nominated by the Principal Secretary Department of Agriculture, Govt. of W.B. The decision of the Board of Arbitration shall be binding on all concerned.

9.15 Defective items: Cost of defective materials will be borne by the supplier only.

9.16 Termination of insolvency:

If the supplier becomes bankrupt or otherwise insolvent, the purchaser reserves the right to terminate the contract at any time, by serving written notice to the supplier without any compensation, whatsoever, to the supplier, subject to further condition that such termination will not prejudice or affect the rights and remedies which have accrued and/ or will accrue thereafter to the Purchaser/ Consignee.

9.19 After Sales and Service:

i. The name and complete address of the company in India authorized by the manufacturer, to provide after sales service for the equipment should be mentioned. The appointed authorized service provider should be holding a valid certificate from the manufacturer to this effect.
ii. The manufacturer should give an undertaking that after the warranty period, they shall provide spares and after sale service of the equipment in India for the normal life time of the equipment.

9.20 University reserves the right to issue work/ supply order either in full or phase wise depending upon the requirement and selected vendor will not charge any extra amount for such supply and delivery.

9.21 (a)Performance Security: It is meant for the expectation of accuracy of the job only. The successful bidder would be asked acceptance and to submit the performance security @ 10% of

the order value in the form of DD/ BG from any nationalized bank in favour of UBKV payable at Cooch Behar. The vendor's response will commence further for issuing supply order by the competent authority of the University. The same would be released after successful supply and installation or commissioning of the instrument.

(b) Security Deposit: It is meant for the security for the warranty period of the item. Security deposit @10% of the order value in the form of DD/BG from any nationalized bank in favour of Uttar Banga Krishi Viswavidyalaya payable at Cooch Behar to be submitted at the time of installation /commissioning of item to ensure warranty period. The same would be released after completion of warranty period.

9.22 **University may forfeit the Security Money (EMD) and Security Deposit in the event of the following circumstances**:

i. Selected bidder withdraws the bid before expiry of its validity and after receipt of the Purchase/work Order.
ii. Selected bidder does not accept the order after issuing the same or fails to enter into a contract within validity period of offer.
iii. Selected bidder fails to supply the items within the scheduled time as specified in the Purchase Order.
iv. If before expiry of the warranty period, the supplied items break down or do not function satisfactorily due to the cause related with the item itself or for its installation and not for any reason caused by the University Authority and the supplier denies to take the responsibility to make the supplied items in order.
v. In case of any false submission /statement by the bidder.
vi. In case of any refusal to abide by terms and conditions or refusal to enter into a written agreement as per prefixed terms and conditions.

9.23 D/D of EMD of disqualified and unsuccessful bidders will be released without any accrued interest after completion of selection process.

9.24 Disposal of Disputes: In case of any dispute, the University's decision will be treated as the final and conclusive. All legal actions are subject to Cooch Behar jurisdiction only

9.25 Conditional bid may be liable for rejection.

9.26 Discretion of the University:

a) University may take decision about non-purchase of the said item even after selection of vendor due to its fund constraints.

b) University may seek documents from the bidder in addition to the scanned documents sent by them at the time of uploading technical bid for verification and evaluation of tender.

c) University reserves the right to relax any clause as stated hereinabove for selection of responsive vender.

d) The University reserves the right not to accept the rate even from the lowest bidder.

e) The University reserves the right to accept or reject any or all tenders without giving any reason whatsoever.

9.27 Contact Details: Bidders may contact to Dr. Ashis Kumar Das, Dean (Actg.), Faculty of Technology, UBKV, (m) +91-9434831119 for any queries regarding items specifications and to Mr. Azad Rahaman Ahmed (m) +91-94348 12945 regarding submission of Tender.

Sd/-
Registrar (Actg.)