

## INVITATION FOR QUOTATION

TEQIP-III/2019/dced/Shopping/\_\_\_\_\_

18-Feb-2019

To,

**WHOMSOEVER IT MAY CONCERN**

**Sub: Invitation for Quotations for supply of Goods**

Dear Sir,

1. You are invited to submit your most competitive quotation **(in hard copy only)** for the following packages **(one quotation for one package)** with item wise detailed specifications given at annexure I,

2. Sr. no.	Tender ID	Package Code	Package Name
1	TEQIP-III/2019/dced/Shopping/103	TEQIP- III/BH/dced/159	EEE P1
2	TEQIP-III/2019/dced/Shopping/104	TEQIP- III/BH/dced/160	EEE P2
3	TEQIP-III/2019/dced/Shopping/105	TEQIP- III/BH/dced/172	EEE P3
4	TEQIP-III/2019/dced/Shopping/106	TEQIP- III/BH/dced/180	EEE P4
5	TEQIP-III/2019/dced/Shopping/107	TEQIP- III/BH/dced/186	EEE P5
6	TEQIP-III/2019/dced/Shopping/108	TEQIP- III/BH/dced/187	EEE P6
7	TEQIP-III/2019/dced/Shopping/109	TEQIP- III/BH/dced/212	EEE P7

**Note: Package wise detailed specification is attached (annexure-I) with this invitation letter and also made available on the institute website.**

3. You must also submit the following information along with the bid.
  - i. Supplier Name:
  - ii. Address (with Pin Code):
  - iii. Contact person Name:
  - iv. Email ID:
  - v. Mobile No.
  - vi. GST No.
  - vii. PAN No.

4. Government of India has received a credit from the International Development Association (IDA) towards the cost of the **Technical Education Quality Improvement Programme [TEQIP]-Phase III** Project and intends to apply part of the proceeds of this credit to eligible payments under the contract for which this invitation for quotations is issued.
5. Quotation,
  - 5.1 The contract shall be for the full quantity as described above.
  - 5.2 Corrections, if any, shall be made by crossing out, initialing, dating and re writing.
  - 5.3 All duties and other levies payable by the supplier under the contract shall be included in the unit price.
  - 5.4 Applicable taxes shall be quoted separately for all items.
  - 5.5 The prices quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
  - 5.6 The Prices should be quoted in Indian Rupees only.
6. Each bidder shall submit only one quotation **for one complete package**.  
**The bidder may submit separate quotation (as separate bid document) for each of the package advertised. The package wise detailed specification is available on the institute website <https://www.dce-darbhanga.org/teqip-iii/tenders/> and also attached here for the reference.**
7. Quotation shall remain valid for a period not less than **55** days after the last date of quotation submission.
8. Evaluation of Quotations,  
The Purchaser will evaluate and compare the quotations determined to be substantially responsive i.e. which
  - 8.1 are properly signed ; and
  - 8.2 confirm to the terms and conditions, and specifications.
9. The Quotations would be evaluated for all items together.
10. Award of contract:  
The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

- 10.1 Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.
- 10.2 The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order.
11. Payment shall be made in Indian Rupees as follows:
- Delivery and Installation - 90% of total cost**
- Satisfactory Acceptance - 10% of total cost**
12. All supplied items are under warranty of **minimum 12** months from the date of successful acceptance of items.
13. You are requested to provide your offer latest by **16:00** hours on **30-Mar-2019**.
14. Detailed specifications of the items are at Annexure I.
15. Training Clause (if any): **Yes, as per the requirements of individual item that will be notified in PO while awarding the contract.**
16. Testing/Installation Clause (if any) **Yes.**
17. Information brochures/ Product catalogue, if any must be accompanied with the quotation clearly indicating the model quoted for.
18. Sealed quotation to be sent through speed post/registered post/courier only to the following address:
- Darbhanga College of Engineering, Darbhanga, Mabbi, Post - Lal Sahpur, VIA - PTC, Darbhanga – 846005, Bihar.**
- The Tender ID, Package code and Package name must be written on top of the envelop of the bid document.**
19. **The bidder must mention the details of prior requirement for the installation and commissioning of the items quoted. A separate sheet with item wise requirements in a tabular form may be submitted.**
20. **Payment will be made only after the successful completion of set milestones and the adequate fund allocation from NPIU under TEQIP-III project.**

21. Principal, Darbhanga College of Engineering, Darbhanga, reserves the rights to accept the lowest or any tender and also of rejecting all or any tender without assigning any reason for the same.
22. The entire dispute with regard to the contract of purchase of items/packages will be subject to Legal jurisdiction of Darbhanga only.
23. The Dealer must have Annual Turnover of Rs. 1 (One) Crore or more for last 3 consecutive years. Copy of Balance Sheets and PL statements must be submitted with the Bid.
24. The Bidder / Authorised Dealer / Manufacturer whosoever is submitting the tender must have at least 3 years' experience of successful execution of contracts of similar nature to Central / State Govt. Departments / Organizations / Technical Institutions / TEQIP-III Institutions. Relevant Proofs (Order Copies) must be attached with the Bid.
25. The Bidder must have valid PAN / GST No., Copy of which must be attached.
26. The Bidder must submit last 3 years ITR.
27. The Bidder has to submit an Affidavit that his firm has not been blacklisted by State Govt. / Central Govt.
28. The Bidder must give warranty of at least 12 months of the products/items supplied.
29. The quotation submitted must contain mandatory information such as GSTIN, HSN code, Bifurcation of CGST & SGST, Taxable value and Invoice value, etc.
30. Preference will be given to:
  - The Bidders possessing relevant certification by an authorized body such as ISO etc.
  - The bids that have quoted the items certified for standard, quality and safety such as BIS, ISI etc.
  - The Bidders having dealer/supplier base in Bihar to prove its capability to provide after sales services as and when required.
31. We look forward to receiving your quotation and thank you for your interest in this project.

*AKR*  
18/2/19

(Dr. A K Rai)  
Principal – cum – IPD  
TEQIP-III, DCE, Darbhanga

*Ashutosh*  
18/2/19

**FORMAT FOR QUOTATION SUBMISSION**

(In letterhead of the supplier with seal)

Date: \_\_\_\_\_

To:

\_\_\_\_\_  
\_\_\_\_\_

Sl. No.	Description of goods (with full Specifications)	Qty.	Unit	Quoted Unit rate in Rs. (Including Ex Factory price, excise duty, packing and forwarding, transportation, insurance, other local costs incidental to delivery and warranty/ guaranty commitments)	Total Price (A)	Sales tax and other taxes payable	
						In %	In figures (B)
<b>Total Cost</b>							

Gross Total Cost (A+B): Rs. \_\_\_\_\_

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs. \_\_\_\_\_ (Amount in figures) (Rupees \_\_\_\_\_ amount in words) within the period specified in the Invitation for Quotations.

We confirm that the normal commercial warranty/ guarantee of \_\_\_\_\_ months shall apply to the offered items and we also confirm to agree with terms and conditions as mentioned in the Invitation Letter.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

Signature of Supplier

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Contact No: \_\_\_\_\_

**DARBHANGA COLLEGE OF ENGINEERING, DARBHANGA**

**ELECTRICAL & ELECTRONICS ENGINEERING DEPARTMENT**

**1. Package Name: EEE P1**

**Package Code: TEQIP- III/BH/dced/159**

**Basic Electrical Engineering Lab**

Sl. No.	Detailed specification of the instruments / equipment	Quantity
1	<p><b>Motor Braking Method System</b>            The Trainer should have following features :</p> <ul style="list-style-type: none"> <li>• Following trainer may need a few set of associated panels (4 nos. typically) which are mounted in a light weight sturdy aluminum flat demo panel system.</li> <li>• Facilitates easy &amp; safe wiring by students due to 4mm sturdy shrouded banana patch cords &amp; shrouded socket arrangement for high voltage circuits.</li> <li>• Each panel has ABS molded plastic sturdy enclosure, &amp; colorful screwless overlays showing circuit diagram &amp; its connection tag numbers for easy understanding &amp; connections.</li> <li>• Set of Instructor Guide &amp; Student Workbook</li> </ul> <p><b>Technical specifications:</b>            It should consists of :</p> <p><b>1] Instrumentation Power supply cum Multi- channel DPM panel</b>            (a) +/-12 V, 500 mA (b) +5V, 300mA            (c) Unregulated 17V dc/750 mA            (d) line synchronizing signal.            (e) Multi channel DPM for digital display of speed, etc.</p> <p><b>2] SCR Actuator (variable DC) cum sensor signal conditioning panel</b>            (a) Full bridge SCR based 0V-195V / 12 Amp cosine firing with linear characteristics.            (b) Supports signal conditioning circuit for speed to give output 0-2.5Vdc (FS).            (c) 2 Nos. of these supplies required for DC Armature &amp; DC motor field.</p> <p><b>3] DC voltmeter &amp; DC ammeter panel</b>            (a) DC voltmeter (0-300V)            (b) DC Ammeter (0-5A) with polarity protection diode            (c) Field failure relay to control Armature supply.</p> <p><b>4] DC Integrated Motor Specifications</b>            (a) 180V/300W/1500RPM with series shunt &amp; compound windings, Chasis mounted table top with spring balance loading arrangement [10kg] &amp; Electronic Tacho:1V/1000RPM. Electrical Tacho :10V/1000RPM.</p>	1

2. **Package Name:** EEE P2

**Package Code:** TEQIP- III/BH/dced/160

**Basic Electrical Engineering Lab**

Sl. No.	Detailed specification of the instruments / equipment	Quantity
1	<p><b>House/ Commercial Wiring Installation Trainer</b></p> <p>EHIT Electrical Home Installation Trainer is a rugged training system for the Electrical laboratories mounted on Aluminum profile rack with sturdy table top flat panel. Each panel has ABS molded plastic sturdy enclosure with 4mm shrouded connectors showing circuit diagram &amp; its connection tag numbers for easy understanding and connections. The product helps you to get fully acquainted with the basic concepts and functioning of an Electrical Machines &amp; Generator.</p> <p>Trainer having control panel should provided in 40X40mm Aluminum profile rack with sturdy table top flat panel. Should have 12 no's of ABS plastic panel mounted on the aluminum rack with mimic diagram &amp; one ACP panel. All input &amp; output are terminated in 4mm shrouded connector, Should provide 4mm banana cable for experiments. Should have MCB, ELCB, Lamp mounted on ACP Panel: 1 Phase MCB 6A-nos, 16A-2nos, ELCB with 1 phase Power chord for supply with Indicator, 20w Led Tube Light(2nos), 20W Led Panel Light, 10W Led Bulb, Mercury bulb, Incandescent Bulb, 230V operated Fan. Should have Residential Switch panel-1: Surface mount 2way 3terminal, 10A, Surface mount 1way 2terminal,10A, Surface mount 1way 2terminal,10A illuminated, Surface mount marked "Bell", Surface mount dimmer, Surface mount Push Button, 1N.O 1N.C. Should have Residential Switch panel-2: Surface mount Cam Selector Switch ON/OFF (2nos), Surface mount 2 way 4terminal toggle Switch, 10A(2nos). Should have 1 Phase Socket panel-1: 1 Phase Socket with switch, 13A, 3 prong, 1 gang. Should have 1 Phase Socket panel-2: 1 Phase Socket with switch, 16A, 3 prong, 1 gang. Should have 1 Phase Socket panel-2: 1 Phase Socket with switch, 16A, 1 gang. Should have Bell/Buzzer panel. 230V AC operated door bell, 12V operated Buzzer.- 12V Door Lock. Should have Door Phone panel: Door Phone Signaling with camera, Speaker, Mic, 12V DC power supply output, Should have Door station panel: Door station with camera, display, Speaker, Mic, Should have Intercom panel, 3 extension intercom system. Should have Telephone panel: (2nos) 1 telephone system. Should have Multifunction meter panel: 1 Phase Meter to measure V, A, KWH. Hz</p> <p>Study of components in Home electrical items provided. Study of connection for Door bell, Lamp, Fan. Study of connection for Buzzer. Door lock Study of connection for Door station. Study of connection for intercom system Study for load measurement while connecting to home application.</p>	01

2	<p><b>Transient Response in R-L-C series and parallel circuit Trainer Kit</b>  Output Waveform – Sine &amp; square  Frequency and Amplitude Adjustment is provided using Potentiometers  One LED indicator to indicate Power input.  On-board Circuits</p> <ul style="list-style-type: none"> <li>– R-L/R-C Series Circuit</li> <li>– R-L-C Series Circuit</li> <li>– R-L/R-C Parallel</li> <li>– R-L-C Parallel</li> </ul> <p>Fixed DC Power Supply: <math>\pm 12V</math>  All interconnections are made using 2mm banana Patch cords.  Bare board Tested Glass Epoxy PCB is used.  Set of 2mm Patch cords for interconnections</p>	06
3	<p><b>Analog Ammeter with stand</b>  Analog ammeter is used to measure the electrical current in the DC circuit  Apart from being used alone, it is used in the ancillary panel of the low- and high-tension switch board, power cabinet, and controlling house of the transmission and supply systems for DC power, and diverse electric control gears  Measuring Range: 0-10A DC  Accuracy: Class 1.5  Mechanical shock test: the maximum of acceleration, 147m/s<sup>2</sup>.</p>	10
4	<p><b>Analog Ammeter with stand</b>  Analog ammeter is used to measure the electrical current in the DC circuit  Apart from being used alone, it is used in the ancillary panel of the low- and high-tension switch board, power cabinet, and controlling house of the transmission and supply systems for DC power, and diverse electric control gears  Measuring Range: 0-5A DC  Accuracy: Class 1.5  Mechanical shock test: the maximum of acceleration, 147m/s<sup>2</sup>.</p>	10
5	<p><b>Analog Voltmeter</b>  Analog Voltmeter is used to measure the electrical current in the DC circuit  Apart from being used alone, it is used in the ancillary panel of the low- and high-tension switch board, power cabinet, and controlling house of the transmission and supply systems for DC power, and diverse electric control gears  Measuring Range: 0-600v DC  Accuracy: Class 1.5  Mechanical shock test: the maximum of acceleration, 147m/s<sup>2</sup>.</p>	10



6	<p><b>DC-DC Converter kit</b>  Dc to dc converters: Must having features:  DC power systems: voltage isolation, adjusting voltage levels, boosting voltage over long wire runs, regulating battery voltage output, and isolating ground loops. These power converters feature selective fuse breaking (SFB) technology as well as the ability to provide up to 125% of their rated output with Power Boost. Phoenix Contact's Quint DC-DC Converters have UL508 approval, as well as Class I, Div. 2 approval. They are suitable for all industrial applications, including critical process industry installations.</p> <p><b>DC-AC converters – PWM waveform</b>  <b>Must have features:</b>  <b>Input &amp; Output</b>  All Wide Range characteristics; AC mains 180~460V, DC output 0~80V/540A to 0~1500V/30A.  Constant Voltage(CV), Constant Current(CC) and Constant Power(CP). CV. CC. or CP working priority setting.  3-phase input possible with all models including 5kW unit. Identical phase current keep the 3-phase AC mains balanced. Meets worldwide power distribution regulation.  Output power 5kW , 10kW , 15kW total 19 models.  Built-in patented Synchronizing circuitry, easy to integrate 100 units to form a 1500kW power supply.  Active power factor correction, PF&gt;0.99(480V input)  Efficiency &gt;95%+. (*2)</p> <p><b>The use of DC-AC converter for speed control of an induction:</b>  <b>Must have following features:</b>  <b>Power supply for the powder brake</b>  Suitable for power supplying with variable voltage the powder brake.  Technical features: <ul style="list-style-type: none"> <li>• Output: 0÷10V, 2 A or 0÷20V, 2 A</li> <li>• Power supply: 220 V, 50/60 Hz</li> </ul> Loads and rheostat unit  Resistors:3 x 15 Ohm, 90 W each,1 Ohm + (0 - 2 Ohm), 80 W <ul style="list-style-type: none"> <li>• Capacitors: 3 x 80 µF, 150 V</li> <li>• Rheostat: 0 - 80 Ohm, 1 A</li> </ul> Torque measuring unit  Suitable to measure the motor output torque through a load cell arranged on the braking system.  Power supply: 220 V, 50/60 Hz  Digital readout and analogue output proportional to the measured value.  Star/delta starter  Star/delta starter for three-phase squirrel cage induction motor.</p>	02
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	<b>Components of LT switchgear:</b> Must have following components: MCB, CONTACTOR, FUSE, THERMAL RELAY, SOCHET	
7	<b>Inductor, Capacitor, Resistor Passive Electrical Elements (R,L &amp; C) of different types</b> Passive elements box containing different types of Resistor, Inductor, Capacitor of different values.	2 box

### 3. Package Name: EEE P3

Package Code: TEQIP- III/BH/dced/172

### Electrical Measurement and Instrumentation Lab

Sl. No	Detailed specification of the instruments / equipment	Quantity
1	<b>Hay Bridge Trainer Kit</b> Mains supply : 230V $\pm$ 10%, 50Hz Sine wave generator Frequency : 1kHz to 10kHz $\pm$ 10% Amplitude : 0 to 5Vpp DPM : 0-200mV Unknown Inductors : 58mH $\pm$ 10% with 58 $\Omega$ $\pm$ 10% of resistance 100mH $\pm$ 5% with 174 $\Omega$ $\pm$ 5% of resistance 116mH $\pm$ 10% with 116 $\Omega$ $\pm$ 10% of resistance Dimensions (mm) : W 240 x D 345 x H 110	2
2.	<b>Lead/Lag Compensator KIT</b> Kit Working voltage :(220-240) VAC Input Voltage :24V AC Input Frequency :50Hz Output Current :0.5Amps	03
3.	<b>Breadboard</b> 840 Points Solderless for DIY Prototyping	15
4.	<b>Resistors set, capacitors set</b> Registers in ohm, Kilo-ohm and capacitor in micro-faraday and pico-faraday	10

**4. Package Name:** EEE P4

**Package Code:** TEQIP- III/BH/dced/180

**NETWORK THEORY LAB**

Sl. No	Detailed specification of the instruments / equipment	Quantity
1	<b>Breadboard connecting wire</b> Breadboard jumper cable Length (approximate) =10-15 cm Type : male to male Current Capacity = 2-3 AMP. 24 AWG	30
2.	<b>Breadboard</b> Full size solderless breadboard with 830 to 840 points Dimension: 5.5 cm(+/- 1 cm) x 17 cm(+/- 1 cm) x 1cm(+/- 0.1 cm)	10
3.	<b>Capacitor Box</b> Voltage rating = 40-50 Volt Assorted capacitor boxes with values from 1 pico farad to 10k pico farad	05
4.	<b>Tool Kit</b> 108 –piece, All-in-One Metal Hand Tool Kit Dimension: 370mm x 270mm x 85mm Package Contents: 9-Pieces Screwdriver Bits, 6-Pieces Hexagon Socket Wrench, 8-Pieces Precision Bits, 2-Pieces Adaptors, 1-Piece Ratchet Hand Screwdrivers, 8-Pieces Allen Keys, 3-Pieces Masonry Drill Bits, 30-Pieces S-Plugs, 30-Pieces Screws, 1-Piece Flat-Nose Pliers, 1-Piece Combination Pliers, 1-Piece Tester, 1-Piece Hammer, 1-Piece Cutter, 1-Piece Measuring Tape 3m, 1-Piece Insulation Tape, 1-Piece Torch, 1-Piece Wrench, 1-Piece Handsaw	10
5.	<b>Soldering Kit</b> 25 Watt kit with soldering iron, soldering paste flux, soldering iron stand, wire cutter, Desolder	03
6.	<b>Inductors</b> Current rating =3 Amp decade Inductor boxes with four dials MULTIPLIERS:- x1mH, x10mH, x100mH, x1H	10

7.	<b>Resistance box</b> Assorted resistance boxes with values ranging from 500 ohm to 2 M ohm , 1/4 watts to ½ wa	05
8.	<b>Breadboard jumper wire kit box</b> U shaped solderless Breadboard jumper cable wire kit 22 AWG Wires of 10 to 14 different len Including length: 2,5,7,10,12,15,17,20,22,25,50,75,100, and 125 mm	05

5. **Package Name:** EEE P5

**Package Code:** TEQIP- III/BH/dced/186

**CONTROL SYSTEMS LAB**

Sl. No.	Detailed specification of the instruments / equipment	Quantity
1	<p><b>Temperature control system</b>  Industrial PID Controller: 1 no.  Supply Voltage : 230V AC Input : Accuracy 0.2%FS  Thermocouple : K Type  RTD : PT100  Output : 4 to 20mA, Relay  Control Algorithms : PID, P, PI, PD, On/Off  PID Range : P : 0 to 200% I : 0 to 3600 Sec D : 0 to 900 Sec  Communication : RS485  Temperature Display: 2 nos.  Display : 4 Digit, 7 segment digital display  Keys : 3 for digital setting  Input Type : RTD (PT100) &amp; Thermocouple  Resolution : 1 or 0.1 degree  Temperature Unit : Degree C  Supply Voltage : 230V AC  RTD Sensors: 2 nos.  Type : RTD (PT100)  Wire : 3 wire  Rod Length : 6"  Temperature Range : (-99 to 850°C)  Thermocouple Sensors: 2 nos.  Type : K Type, Wire : 2 Wire  Rod Length : 6"  Temperature Range : -200 to1250°C  Temperature Transmitter  RTD : 1 no. 0 Range : 0-200 C  Output : 4 to 20mA</p>	1

	<p>Type : Head mounted  Input : RTD (PT100), 3 wire Loop  Supply : 24V DC nominal (12 to 36)V DC  Temperature Transmitter  Thermocouple : 1 no. 0 Range : 0-200 C  Output : 4 to 20mA  Type : Head mounted  Input : Thermocouple (K Type) Loop  Supply : 24V DC nominal (12 to 36)V DC  <b><u>Panel Component Description</u></b>  AC Voltage : 0.1 mV ~ 750V  DC Current : 0.1uA ~ 20A  AC Current : 0.1uA ~ 20A  Frequency : 0.1Hz ~ 30MHz  SSR (SCR Power Controller) : 1 no.  Heater : 1 no.  Power : 1000W  Supply : 230 V AC (1500Watt)  Fan : 2nos.  Supply : 230V AC  MCB : 1no.  Supply : 230V AC  Current : 16Ampere  Contactor : 2 nos.  Supply : 230V AC  Power Indicator : 1 no.</p>	
2	<p><b>Single phase dual convertor trainer kit</b>  Technical Specifications:  Instrumentation Power supply :  a) +/-12 V, 500 mA (b) +5V, 300mA, c) Unregulated 17V dc/750 mA  SCR Actuator (variable DC) cum sensor signal  Conditioning: a) Full bridge SCR based 0V-195V / 3 Amp cosines firing.  DC voltmeter and DC ammeter:  a) DC voltmeter (300-0-300VDC)  b) DC Ammeter (5-0-5A)  1 phase Motor, Alternator &amp; Sync. Motor : 1 phase MCBs of 4A/1.6A  2nos  Single Phase Dual Converter Controller :  2 No. CTs (1A/30mA)  700VA Isolation Transformer  DC Motor : 200VDC/ 200W with 1500RPM or 60W Isolation  Transformer: 230:230@3A, 1 Phase</p>	4

**6. Package Name: EEE P6**

**Package Code: TEQIP- III/BH/dced/187**

**MACHINE LAB II**

Sl. No.	Detailed specification of the instruments / equipment	Quantity
1	<p><b>Dielectric Strength Measurement tool for transformer oil</b>            Voltmeter: upto 100kV            Mains Supply: 230V AC <math>\pm</math>10%, 50Hz            Single Phase Variac: 230V/ 0-270V            High Voltage Source: 80kV, 20mA            HV Control Motor Type: Servo Motor            500 (No Load)            Voltmeter: to 100kV</p>	1
2	<p><b>Three phase induction motor with panel</b>            (To determine no load &amp; blocked rotor tests and load test on three phase squirrel cage induction motor)  <b>Ac squirrel cage induction motor</b>            5HP, 415V AC Squirrel Cage Induction motor directly coupled to mechanical load with belt, pulley and round dial balance loading arrangement with brake drum and friction belt, mounted on a MS base Frame</p> <ol style="list-style-type: none"> <li>Capacity 5 HP</li> <li>RPM 1420</li> <li>Insulation class 'F'</li> <li>AC Squirrel cage induction, 3 phase</li> <li>Degree of protection IP-55, Conforming to IS -12615:2011</li> <li>Volt 400/415 AC Hz</li> <li>Power factor 0.85</li> <li>Totally enclosed Fan cooled</li> <li>Continuous duty constant rating</li> <li>Efficiency at rated load 85%</li> <li>Energy Efficiency Class IE3 with ISI Marking Provided with speed sensor and display</li> </ol> <p><b>Phase Auto Transformers: 415V, 50 Hz, 15 Amp</b>  <b>Mechanical loading arrangement</b>            Pronney Brake Loading arrangement, consisting of aluminium Drum Pulley having heat suppressing facility, round dial spring balances, Canvas belt with hooks, threaded studs with wheel for tightening the belt, Frame and base complete.</p> <p><b>Control Panel</b> :- Fitted on ENGRAVED bakelite sheet more than 5mm enclosed in Box suitable for table mounting or fixed on table            Digital Multi Function Meter suitable for Three Phase accurate &amp; reliable True RMS technology Class 0.2 Accuracy</p>	1

	<p>8 Amp Three-Phase Continuously variable Variac Closed type  MCB 16A, 415V. 1 No.  Indicating Light. 3 Nos.  Star Delta Starter, fully Automatic with time delay arrangement  Single Phase Single Element dynamometer type  Portable Wattmeter 5/10A, 150/300/600V 2 Nos.  Insulation terminals</p>	
3	<p><b>Three Phase Synchronous Motor With Panel</b>  (To plot v curve and inverted v curve of synchronous motor at different loading condition.)  Type: Salient pole dove tail type construction with damper windings, Self synchronising Induction Start with built in separate DC Excitation facility, Screen protected. Horizontal foot mounted.  Capacity:3 HP, 4 Pole  RPM:1500  Volts:415  Insulation: Class ‘B’  Connections: All connections brought over to a terminal box fixed to top of motor.  Excitation: Excitor 220V, DC through slipring.  Starter: D.O.L. Starting  <b>D.c. shunt generator</b>  Type: DC Shunt Generator, screen protected horizontal foot mounted.  Capacity: 1.5 KW, 4 Pole  Cooling : Fan cooled  RPM: 1500  Volts: 230 V. DC  Insulation: Class ‘B’  Connections: Shunt All terminals of armature &amp; field coil brought over to a terminal box fitted on top of Motor.  <u><b>Coupling &amp; Mounting</b></u>  The machines should be flexibly coupled through couplings with protective coupling guard and mounted on sturdy m.s. channel base.  <b>Table mounting type control panel for above mg set : v curves of synchronous motor (electrical loading) :</b>  Fitted on ENGRAVED bakelite sheet more than 5mm enclosed in Box suitable for table mounting or fixed on table.  <b>For DC generator</b>  (i) Digital DC Voltmeter 300 V  (ii) Digital DC Ammeter, 0-10 A  (iii) Double Pole Iron clad cutout 16 A  (iv) Field Rheostat 1.4 A, 260 Ohms  <b>For synchronous motor</b>  (i) Digital AC Voltmeter, 0-600V  (ii) Digital AC Ammeter, 0-5 A  (iii) <b>Digital multi function meter</b>  (iv) TP MCB</p>	1

	<p>(v) Indicating Light.</p> <p>(vi) Excitation Controlling Arrangement</p> <p>(vii) D.O.L Starter</p> <p>(viii) Excitation Switch</p> <p><b>For excitor</b></p> <p>(i) Digital DC Volt meter, 0-300V</p> <p>(ii) Digital DC Ammeter, 0-2 A</p> <p><b>Accessories</b></p> <p><b>Resistive Load 1-Phase, 3 KW 10 Steps</b></p> <p>Specifications</p> <ul style="list-style-type: none"> <li>• Fully powder coated</li> <li>• Loaded with number of Quality rotary switches</li> <li>• The fixed resistors are made-up from resistance wires of suitable size having very low temp. Coefficients are wound on insulated porcelain pipes with Green adhesive coating and are grilled in vertical array for efficient cooling.</li> <li>• The pipes should be housed in sheet metal case enclosure provided with Caster wheels.</li> <li>• Suitable to continuous applications</li> </ul>	
4	<p><b>Single phase induction motor with panel</b> (To plot speed torque characteristics of capacitor start type induction motor)</p> <p><b>Ac squirrel cage capacitor start induction motor</b> Squirrel Cage Capacitor start Induction motor directly coupled to mechanical load with belt, pulley and round dial balance loading arrangement with brake drum water cooling.</p> <p>a. Capacity 1HP</p> <p>b. RPM 1420</p> <p>c. Insulation class 'F'</p> <p>d. AC Squirrel cage Induction Motor, 1- Phase</p> <p>f. Volt 230 AC Hz</p> <p>h. Totally enclosed Fan cooled</p> <p>i. Continuous duty constant rating</p> <p>k. Provided with speed sensor and display</p> <p><b>Mechanical loading arrangement</b> Pronney Brake Loading arrangement, consisting of Drum Pulley having water cooled heat suppressing facility, round dial spring balances, Canvas belt with hooks, threaded studs with wheel for tightening the belt, Frame and base complete.</p> <p><b>Control Panel</b> :- Fitted on ENGRAVED bakelite sheet more than 5mm enclosed in Box suitable for table mounting or fixed on table.</p> <p>1. Digital AC Voltmeter, 0-300V</p> <p>2. Digital AC Ammeter, 0-10 A</p>	1

1 No.

1 No.



	<p>3. MCB Double Pole 1 No.</p> <p>4. Indicating Light. 3 Nos.</p> <p>5. DOL Starter</p> <p>6. Single Phase Single Element dynamometer type Portable Wattmeter 5/10A, 75/150/300 V 1 No.</p> <p>7. Insulation terminals</p> <p>8. Single Phase Variac 8 A, 0-270V 1 No.</p>	
5	<p><b>3 Phase Alternator with. the panel</b>  (to measure direct axis and quadrature axis reactance of synchronous machine)  <b>Motor generator set : d c shunt motor/3 phase alternator salient pole type (rotating field)</b>  DC Motor</p> <p>Type : DC Shunt wound, screen protected. Horizontal foot mounted  Capacity. : 5 HP, 4 Pole  RPM : 1500 (controlled variation)  Volts : 230  Insulation : Class ‘B’  Cooling : Fan cooled  Connections : Shunt, all the terminals of Armature and shunt field winding to be connected to a bakelite sheet fixed to C I terminal fix fitted on the panel</p> <p><b><u>Alternator :</u></b>  Type : Salient pole dove tail type construction with damper winding screen protected, horizontal foot mounted, fan cooled, synchronous  Capacity. : 3 KVA, 4 Pole  RPM : 1500 for max output and frequency of 50 Hz  Volts 415V  Insulation Class ‘B’  Frequency 50 Hz  Power factor : 0.8 p.f lagging  Connections : 3 phase 4 wire</p> <p><b><u>Excitor</u></b> :  Type : Static type through sliprings.</p> <p><b><u>Coupling &amp; Mounting</u></b>  The machines should be flexibly coupled through tyre coupling with protective coupling guard and mounted on sturdy m.s. channel base.</p> <p><b><u>CONTROL PANEL</u></b>  Fitted on <b>ENGRAVED BAKELITE</b> sheet enclosed in almirah type ms box suitable for table mounting.</p> <p><b><u>For DC Motor</u></b></p>	

	<ul style="list-style-type: none"> <li>(i) Digital DC Voltmeter, 0-300 V</li> <li>(ii) Digital DC Ammeter, 20 Amp</li> <li>(iii) Starting Compensator, DC Starter face plate type.</li> <li>(iv) Double Pole MCB 20 A,</li> <li>(v) Armature Rheostat 5 A, 45 Ohms</li> </ul> <p><b><u>For AC Generator</u></b></p> <ul style="list-style-type: none"> <li>(i) Digital AC Voltmeter, 0-500V</li> <li>(ii) AC Ammeter, 0-10 A</li> <li>(iii) T.P. M.C.B</li> <li>(iv) Excitation controlling arrangement</li> <li>(v) 3 Phase Variac, 10 Amp, 0-470V,</li> </ul> <p><b><u>For Excitor</u></b></p> <ul style="list-style-type: none"> <li>(i) Digital DC Voltmeter, 0-300V</li> <li>(ii) Digital DC Ammeter, 0-2. A</li> </ul>	
	<b>Compulsory Accessories to run above equipment</b>	
1	<p><b>Distribution panel</b> (Suitable for complete electrical machine lab)</p> <p><b><u>Incoming</u></b></p> <ul style="list-style-type: none"> <li>1) 100 AMP MCCB: L&amp;T/Hager</li> <li>2) 63 Amp DP Isolator (for DC rectifier supply): L&amp;T/Hager</li> <li>3) Digital Multifunction Meter</li> <li>4) Indication Lamp for AC</li> <li>5) Indication Lamp for DC</li> <li>6) Current Transformer 100/5: AE/Kappa/L&amp;T</li> <li>7) Fuse Base with Fuse Link: L&amp;T</li> <li>8) Phase Sequence Indicator with Push Button</li> </ul> <p><b><u>Outgoing</u></b></p> <ul style="list-style-type: none"> <li>1) MCB for DC Machine : 1No.</li> <li>2) MCB (1 Ph AC Machine) : 1No.</li> <li>3) TPN MCB (3 Ph AC) : 2No.</li> <li>4) TPN MCB (3 Ph AC to input of rectifier supply)</li> <li>5) MISC ITEMS (Heat Shrink Sleeve, Bus bar insulator, PVC Ferrule, Thimble, Gasket, Legend Plate, Terminal Rail, Bus Bar etc.)</li> </ul>	1
2	<p><b>A.c. to d.c. power supply rectifier type with transformer</b></p> <p><b><u>Input</u></b> 440 V. 3 ph, 50 Hz, A.C. Output Volts: 250 V DC with 5 steps on load control by means of two rotary switches. Output Current: 60A. DC Capacity. :15 KW Duty cycle :100 % continuous.</p>	1

**Cabling and pedestals :** The Machine & panel should be interconnected from AC Panel (OR DC Rectifier bus) through UG Cable of size 16/4 sqmm for 32/16Amps switches and 20/4 sq mm for 32 Amps switches( depending upon rating of machine. The make of the cable should be of standard quality

Earthing of machines is required and is to be terminated to main earthing which would be provided by the supplier

Construction of Pedestals to mount the motor and generator sets firmly bolted to the surface of concrete foundation of height 3 ft. and length and width as per requirement

- Each experiment should have separate experiment tables for mounting of control panels for experimentation, and it should be of size not less than 5x3 (top) with top wood of thickness 18 to 20 mm, the table should be made with solid wood. Table should be fitted with Almirah with locks.
- There should be provision for reinstallation of entire set up to a new location if required within 15 months.

### **Important Notes**

- (i) The Machines should be CE certified and RoHS Compliant. The necessary certificate should be attached with offer.
- (ii) The Machines should be made of super enameled Copper windings wire only and should be tested/operated on full load condition.
- (iii) All the meter & accessories should be of STANDARD quality and make.
- (iv) Internal wiring of panel should be made by good quality Copper Wire.
- (v) Warranty on each rotating machines should be of 5 years minimum, warranty on meters should be of 1 years minimum
- (vi) Instruction manual for each equipment and machine and lab manual for each experiment should be provided.
- (vii) Make of the motor should be Motco/Allen/Elmo

**7. Package Name:** EEE P7

**Package Code:** TEQIP- III/BH/dced/212

**DIGITAL ELECTRONICS LAB**

<b>Sl. No.</b>	<b>Detailed specification of the instruments / equipment</b>			<b>Quantity</b>
1	IC no.	Qty	1500	
	7404, 7408, 7432, 7400, 7402, 7486, 7476, 7495, 7410, CD4011, CD4001, LS7420	100 each		
	7483, 74153, 74139, 7485, 74148, 7447, 7490 74193, 2114, 555 TIMER	30 each		
2	LED GREEN, RED, YELLOW			200
3	Various types of Flip Flops trainer Kit 0-5 V, 0-12 V Variable Power Supply, Input: 1-phase, 230V, 50HZ AC supply  <b>Warranty term of 2 years for KIT</b>			04
4	Study of shift registers using J-K Flip Flops (7476) trainer Kit 0-5 V, 0-12 V Variable Power Supply, Input: 1-phase, 230V, 50HZ AC supply  <b>warranty term of 2 years for KIT</b>			04
5	7 Segment Display			30