



DIRECTORATE OF TECHNICAL EDUCATION AND TRAINING, ODISHA
(DTE&T)

Invites

REQUEST FOR PROPOSAL (RFP)

for

Supply, installation, commissioning, and maintenance of machines or
equipment for various mining trades at Govt. ITI Koira

CORRIGENDUM 4

With extension of last date for submission of proposals till
31st August'2022

NIT NO: DTE&T/ 2022-23/6737

DATE: 04.06.2022

Issued by:

DTE&T

KillaMaidan, Buxi Bazar,
Cuttack-753001
Phone No-0671(2301061),
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NOTICE OF INVITING PROPOSAL

Director of Technical Education & Training, Odisha invites RFP to supply, installation, commissioning, and maintenance of machines/equipment for various mining trades at Govt. ITI Koira

Directorate of Technical Education & Training, Odisha

NIT No: DTE&T/2022-23/6737

Cuttack, Dated: 04.06.2022

The Directorate of Technical Education & Training (here referred as 'DTE&T'), Odisha, invites Technical and Financial Proposals from the world's leading original equipment manufacturer (OEM) companies or its Authorised Vendors to supply, installation, commissioning, and maintenance of machines/equipment for various trades under mining sector at Govt. ITI Koira, Odisha.

The bidders are expected to examine all instructions, forms, terms, Project requirements and other information in the RFP documents. Failure to furnish all information required as mentioned in the RFP documents or submission of a proposal not substantially responsive to the RFP documents in every respect will be at the Bidder's risk and may result in rejection of the proposal.

Bidders are requested to submit the proposals to the undersigned as per the schedule indicated in the Fact Sheet, by post (Registered / Speed) at the office of the DTE&T, Odisha. Based on the evaluation method mentioned in the RFP, the bidder will be selected.

For any further clarifications, please contact Mr. Abhishek Mohanty ATO, on Mobile: (+91) 9040083060 or Email: pmu.dtet@gmail.com; dtetodisha.procurement@gmail.com, dtetorissa@gmail.com during official working hours only (10 am to 5 pm).

Sd/-

DTE&T, Odisha

DISCLAIMER

The information contained in this Request for Proposal (herein after referred to either "RFP") document or subsequently provided to the Bidders, whether verbally or in documentary or any other form by or on behalf of the Directorate of technical Education and Training, Odisha herein after referred to as DTE&T, or any of their employees or advisors, is provided to the Bidder(s) on the terms and conditions set out in this RFP document and all other terms and conditions subject to which such information is provided.

DTE&T reserves the right to reject any or all of the proposals submitted in response to this RFP document at any stage without assigning any reasons whatsoever. DTE&T, ODISHA also reserves the right to withhold or withdraw the process at any stage with intimation to all who submitted the RFP document response. DTE&T, ODISHA reserves the right to change/ modify/amend any or all of the provisions of this RFP document. Such changes would be posted only in its website (www.dtetodisha.gov.in). Prospective bidders are requested to visit the website frequently to keep them abreast with the latest developments on this tender.

This is not an agreement and is not an offer or invitation to enter into an agreement of any kind with any party. The purpose of this RFP is to provide interested parties with information that may be useful to them in making their technical & financial offers (Bids) pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the DTE&T, ODISHA in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFP document may not be appropriate for all persons, and it is not possible for the DTE&T, ODISHA, their employees or advisors to consider the business/investment objectives, financial situation and particular needs of each Bidder who reads or uses this RFP document.

The assumptions, assessments, statements and information contained in this RFP may not be complete, accurate, adequate or correct. Each Bidder should conduct its own investigations and analysis and should check the accuracy, reliability and completeness of the information in this RFP document and wherever necessary obtain independent advice from appropriate sources. DTE&T, ODISHA, their employees and advisors make no representation nor warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of the RFP document.

Contents

| | |
|-----------------------------------------------------------------------------|----|
| Important Dates and Schedule | 5 |
| Introduction, Objective and Scope of work | 6 |
| Special Terms and Conditions | 7 |
| Section 1: Package wise list of equipment and their specifications | 8 |
| Section 2: Pre-qualification Criteria/ Minimum Eligibility for Bidder | 66 |
| Section 3: Instructions to Bidder (ITB) and Data Sheet | 68 |
| Section 4: Deliverable and Payment Schedule..... | 81 |
| Section 5: Documents/Details to be submitted with Technical Proposal | 82 |
| Section 6: Evaluation and Selection of bidder | 83 |
| Section 7: Technical and Financial Proposal Standard Forms | 86 |
| Section 8: Annexures | 93 |

Important Dates and Schedule (FACT SHEET)

| S. No | Particular | Timeline |
|-------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1. | Availability of RFP document in public domain | 4 th June 2022/ Saturday onwards |
| 2. | Submission of pre-bid queries through email | 28th June 2022/ Tuesday To be submitted before 14:00Hours |
| 3. | Pre- bid meeting (Virtual) | 30th June 2022/ Thursday At 15:00 Hours onwards throughVC |
| 4. | Issuance of pre- bid meeting clarification and Corrigendum RFP with availability on DTE&T website (www.dtetodisha.gov.in) | 12th July 2022/ Tuesday |
| 5. | Deadline for submission of Proposal | 31st August 2022/ Wednesday To be submitted before 17:00Hours |
| 6. | Bid Processing Fee/Tender Fee (Non-refundable) (Demand Draft) | INR 10,000/- (Rupees Ten Thousand Only) |
| 7. | Bid Security Declaration (Annexure - 8) | Bidders need to submit Bid Security Declaration as per the format given in Section 8 (Annexure – 8) in this RFP |
| 8. | Performance Bank Guarantee | 3% of the Total Bid Value |
| 9. | Method of Selection | Quality and Cost-Based Selection (QCBS) |
| 10. | Opening and evaluation of Proposals | To be scheduled later |
| 11. | Notification of “Final Selected Bidder” | To be scheduled later |
| 12. | Issuance of Work Order (WO) | To be scheduled later |
| 13. | Contract negotiation and signing of contract | To be scheduled later |
| 14. | Commencement of work | To be scheduled later |

Note:

1. DTE&T, ODISHA reserves the right to change any schedule. Please visit the website mentioned in the RFP document regularly for the same.
2. Proposals must be submitted before the date, time and venue mentioned in the Fact Sheet. Proposals that are received after the deadline will not be considered.

1. Introduction:

1.1 Background

The Directorate of Technical Education and Training, Odisha, having its principal office at Killa Maidan, Buxi Bazaar, Cuttack-753001 (hereinafter referred to as the “DTE&T” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and permitted assigns), looks after technical education at Technical Institutes/Colleges, Diploma and formal CTS training at ITI level. It also provides Dual System Training, On-the-Job Training, Apprenticeship Training in order to prepare the Youth suitable for gainful wage and self-employment through Nano Unicorn Project of OSDA for a decent livelihood.

DTE&T in association with IMC intend to create suitable infrastructure for the Mining Skill Academy (ITI Koira) including lab settings with modern equipment & machineries for long-term and short-term courses ready-to-job courses out of District Mineral Foundation, Sundargarh resource head and operate / monitor Mining Skill Academy to impart quality skill development training to build a knowledgeable workforce to cater to the demand of local mining industry. Additionally, generation of such industry-ready manpower would ensure India’s competitiveness in the global market.

DTE&T invites proposals from world leading original machineries/equipment manufacturers to supply, installation, commissioning, and maintenance of machines/equipment for various trades under mining sector at Mining Skill Academy (Govt. ITI Koira, Odisha).

1.2 Project overview and objectives:

Government in SD&TE Department have approved to establish new Government ITI at Koira, Sundargarh vide Notification No 5976 I/ SDTE dated 24.11.2015. The construction of the institute has already been completed. Since, the institute is situated in the mining bearing district Sundargarh and surrounded by mining industries, the institute will be able to minimize the shortage of skilled youths with set of basic and advanced skills for mining industries. The institute will support the industries by developing skilled manpower in mining & allied sector in Odisha through long term ITI based Craftsman Training (CTS), mining industry OJT based Dual System Training (DST) & Apprenticeship Training, & Short-term skills through Sector Skill Council (SSC). The activities of procurement of equipment and machineries as required for NSQF aligned 03 CTS courses proposed here by DTE&T, Odisha.

DTE&T will provide the space and workshop at ITI Koira for the supply, installation, commissioning and testing of the equipment & machineries, and maintenance of them.

2. Scope of Work

A. Roles and responsibilities of the selected bidder (Company/ Firm)

- i. The bids are invited for the supply, installation, commissioning and testing (including 7 days hand-holding training) of the equipment’s and equipment wise manuals/brochure, the details of which are mentioned in Section 1, needed for the mining trades at Govt. ITI Koira.
- ii. The selected bidder must supply all new equipment with best quality.
- iii. The selected bidder must deliver Lot wise all the equipment from Package A, B, C & D within 60 days from the date of signing the Contract Agreement. For Package E, the delivery period is upto 120 days from the date of signing the contract agreement.
- iv. Installation and Commissioning must be completed within 15 days from the supply of all the equipment at Govt. ITI Koira.
- v. The selected bidder has to provide warranty of supplied equipment/machines and softwares

- for 36 months from the date of successful commissioning.
- vi. The selected bidder must provide relevant software for unlimited users and with future upgradation without any cost.
 - vii. The selected bidder must provide AMC for 3 years after warranty.
 - viii. Periodic/Preventive maintenance visits must be done by the selected bidder every six months (2 visits in a year) and any time for attending repairs/break down calls.
 - ix. The selected bidder to ensure complete supply of tools, equipment, machineries and services for proposed packages as per table mentioned below and in accordance with the technical specification provided in the RFP document.
 - x. Final selected bidder shall provide 7 days hand-holding to the technical officers/training officers/staffs of the institute on operating the equipment after the installation and commissioning.
 - xi. Bidders may propose better technical specifications which may fit for the Mining Skill Academy and fulfill the objective of the project. Bidders may come with a proposal which includes best in class equipment with advanced technology for the major equipment/machines as per the list given in this RFP document.

B. Roles and responsibilities of DTE&T

- i. Provide space for delivery and installation of the equipment.
- ii. Conduct a post-delivery inspection of equipment by its own technical experts or 3rd party agency/consultants/advisors appointed by DTE&T after the proposed equipment delivered by the selected bidder at the institute. If the selected bidder fails to comply with any of the quality, technical specification or clause mentioned in the RFP, and then the Contract will be terminated by DTE&T.
- iii. Provide necessary electrical power supply, water supply etc. required for installation and commissioning
- iv. Provide assistance for unloading of materials but unloading of equipment is responsibilities of selected bidder.

C. Special Terms & Conditions

- i. Bidders need to submit Mandatory Documents for Pre-Qualification Criteria along with Bid Processing Fee & Bid Security Declaration with their Technical Proposal and Financial Proposal separately in sealed inner envelopes, and clearly marked on the outside as TECHNICAL PROPOSAL and FINANCIAL PROPOSAL, as appropriate. These three inner envelopes shall then be placed and sealed in one outer envelope clearly marked “**RFP for supply, installation, commissioning, and maintenance of equipment for ITI Koira**”.
- ii. Bidders must sign all pages of RFP by their authorized signatory and submit with technical bid.
- iii. **Bidders must bid for all the equipment from a Lot or multiple Lots from a Package or all Packages (A, B, C, D & E) of this RFP.**
- iv. OEM or Authorized Suppliers/Vendors are invited to bid.
- v. Price bid should have equipment/machine wise breakup for every lot & package.
- vi. Price bid should be submitted in the given format in Fin Form I.
- vii. A performance security in the form of Bank Guarantee for 3% of the total Bid Value to be submitted on receipt of the Purchase/Work Order (WO). The Bank Guarantee will be valid for 38 months.

Section 1A: Package wise list of equipment and their specifications

| Module | Equipment Name | Quantity | Reference Section for Technical Specification |
|-------------------------------------------------------------------|------------------------------------------------------------------|----------|-----------------------------------------------|
| Package A: Equipment for Mechanic Mining Machinery | | | |
| Lot 1 | General Machinery Shop Outfit | 1 Set | Page Number – 9 |
| Lot 2 | Welding Equipment | 1 Set | Page Number – 17 |
| Lot 3 | Items required for various Hydraulics Experiments (Open Circuit) | 1 Set | Page Number – 29 |
| Lot 4 | Hydraulics & Fluid Mechanics Lab Equipment (Closed Circuit) | 1 Set | Page Number – 32 |
| Lot 5 | Demonstration Unit with experimental setup (Electrical) | 1 Set | Page Number – 34 |
| Lot 6 | Automobile Equipment | 1 Set | Page Number – 45 |
| Package B: Equipment for Stone Processing Machine Operator | | | |
| Lot 1 | General Machinery | 1 Set | Page Number – 45 |
| Package C: Equipment for Stone Mining Machine Operator | | | |
| Lot 1 | General Machinery | 1 Set | Page Number – 48 |
| Package D: Equipment for Short Term Training Courses | | | |
| Lot 1 | Mining Mechanic/Fitter | 1 Set | Page Number – 51 |
| Lot 2 | Mine Electrician | 1 Set | Page Number – 56 |
| Lot 3 | Loader Operator | 1 Set | Page Number – 62 |
| Lot 4 | Dumper Operator | 1 Set | Page Number – 64 |
| Package E: Mining Simulators and Softwares | | | |
| Lot 1 | Dumper Simulator & Softwares | 1 No | Page Number – 66 |
| Lot 2 | Loader Simulator & Softwares | 1 No | Page Number – 69 |

Section 1B: Minimum Technical Specifications of equipment with quantities

Package A: Equipment for Mechanic Mining Machinery

Lot 1: General Machinery Shop Outfit – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 | V-belt Driven Lathe Machine | <p>Length of Bed: 1370 mm; Width of bed: 235mm; Height of centre: 165mm; Admit between canters: 765mm; Hole through spindle: 42mm; Swing over bed: 315mm; Swing over carriage: 230mm; Lead screw: 6 TPI; Power: 1HP; Accessories: Electrical Motor, 160mm x 3 jaws true chuck, 200mm x 4 jaws dog chuck, motorized coolant pump with fittings, face plate, steady rest, follow rest, Norton gear box, turning attachment, flame hardened bed ways High power transmission capacity because V-grooves provide excellent grip. The functioning of the belt and the pulley is smooth and quiet. The V-belt drive provides compactness due to the small distance between the centers of the pulleys. Slip between the belt and the pulley is negligible.</p> | 1 No |
| 2 | All Geared Lathe Machine | <p>Length of bed : 1370mm;Width of bed : 285mm; Height of centre : 205mm; swing over bed : 410mm; Swing Over cross slide : 205mm; Distance between centers :750mm; Movement of cross slide :240mm; Bed type : 2V & 2 Flat; Type of spindle nose : Taper nose; Taper bore in spindle sleeve : MT-3; Spindle bore : 42mm; Tail stock spindle diameter : 52mm; Tail stock taper bore in spindle : MT-3; Tail stock spindle travel : 150mm; Travel of top side : 160mm; Tool shank section : 25x25mm; No. of speeds : 9; Range : 90 - 1200rpm; No. of feeds : 30; Motor HP : 3HP; Accessories : 160mm x 3 jaw true chuck; 200 mm x 4 jaw dog chuck ; electric - magnetic brake, coolant equipment; splash guard, fixed steady rest, follow rest, face plate, chuck plate, machine lamp, revolving centre, taper turning attachment. The accuracy is very high. The flow of production is more. The machining in the lathe was very fast.</p> | 1 No |
| 3 | Turret Lathe | <p>Bar stock capacity : 25-64mm; Chuck size : 250380mm; Drive motor capacity : 5-10 HP; Swing over ways : 550mm; Speed : 50-150rpm A number of tools can be accommodated. Chucking of larger workpieces can be done. Operators of less skill are required hence lowers the labor cost. Higher rigidity so can withstand heavy loads.</p> | 1 No |
| 4 | All Geared Capstan Lathe | <p>Length of bed: 1370mm; Width of bed: 150mm; Maximum distance between spindle nose to turret face275mm; Cross slide traverse travel 110mm; cross slide longitudinal travel : 150mm; No. of spindle speeds : 3; Range of Spindle speed : 650 - 1660 rpm; Effective stoke of capstan slide : 95; Bore size of hex turret: 25; Centre of holes above turret slide : 40 mm; Height of centre above bed : 150mm; Accessories : bar feed attachment, true chuck 160mm x 3 jaws, The rate of production is higher • Different ranges of speeds are obtained. A</p> | 1 No |

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|---|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| | | number of tools can be accommodated. Chucking of larger workpieces can be done. Operators of less skill are required hence lowers the labor cost. | |
| 5 | Universal Radial Drilling Machine | Drilling Capacity in MS : 38mm; Drilling Capacity in CI : 45mm; Spindle nose : MT-4; Spindle Travel : 220mm; Number of spindle speed :8 (gear drive); Range of spindle speeds (rpm); 62-1980; Main motor hp : 2; Elevating motor hp : 0.5; Size of working table : 380 x 300 x 300mm; Drilling radius max/min : 895/440; Max/Min distance column to spindle : 930/230mm; Diameter of column : 165mm; Swivel of arm L/R side : 90 degrees; Size of base plate : 760 x 1250 x 150; No of T- slots : (4) 16; Overall height : 2000mm; Motorized coolant pump with fittings It is very compatible and handy for machining. It is accurate, economical, portable and least time consuming while machining. Heavy work pieces can be machined in any position without moving them. | 1 No |
| 6 | Planing Machine | Length of stroke: 1220mm; Width between arms: 762mm; Height under cross rail: 762mm; Length of bed: 2033 mm; Width of bed: 457mm; Working surface: 1220 x 610mm; No. of T-Slots: 4; Width of T-slots : 19mm; Motor hp : 3 Greater accuracy. Good surface finish. The major advantages are at a time more than one tool can perform on the workpiece. Low maintenance requires comparatively other machine tools. | 1 No |
| 7 | Slotting Machine | Length of stroke (maximum) : 175mm; Working Stroke : 150mm; Ram adjustment: 125mm; length of ram bearing : 500mm; Throat adjustment : 300mm; Maximum diameter accommodated when machine at centre : 500mm; Height between table and head : 300 mm; Longitudinal feed (manual); 200mm; Longitudinal feed (auto): 175mm; Cross feed (manual) : 225mm; Cross feed (auto): 200mm; Dimension of table : 275mm; Dimension of base plate : 700 x 490mm; Number and range of speeds : 2(30-50); Motor (960 rpm) : 1.5 HP; Optional Accessories : Tilting Head, rapid feed Low initial cost Low maintenance cost Accurate in surface finish Light weight and durable Single point cutting tool makes the tool cost cheaper High machining efficiency | 1 No |
| 8 | All Geared Shaping Machine | Maximum Length of ram stroke: 315mm; Length and width of table top: 315 x 250mm; Depth of table slide: 280mm; Horizontal traverse of table: 400mm; Vertical traverse of table: 350mm; Travel of tool slide 125mm; Swivel of tooth head on either side of vertical: 60degree; Number of ram speed: 4; Range of ram speeds: 20-115rpm; Range of table feeds: 3; Driving motor: 3HP The extra heavy duty all geared lathe is a suitable for easily executing high end tasks and powerful machining jobs. It provides total freedom for effectively cutting and drilling tough metals. This machine provides top quality results and has applications in various heavy industries. | 1 No |
| 9 | Universal Milling Machine | Surface of table : 900 x 225mm; Distance between T-slot: 55mm; Longitudinal travel of table : 485mm; Cross travel of table :150mm; Vertical adjustment of table : 275mm; Distance between centerline of spindle to lower surface of overarm : 140mm; Taper in spindle : ISO 40; Diameter of milling arbor : 25.4mm; Range of spindle speed : 75,140,210,275,350,525 rpm; | 1 No |

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|----|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| | | <p>Number of feeds : 3; Motor : 2HP/1440 rpm; Motorized coolant pump</p> <p>The size and durable construction of the milling machine give tremendous support to handle large and heavier machines without damaging itself. It provides flexible computer control options for cutting purposes. It reduces the chances of human errors. It assures accurate cuts</p> | |
| 10 | V-Belt Driven Hydraulic Control Hacksaw Machine | <p>Size : 7"; Stroke : S1/^; Number of stokes per minute : 100-120; Motor HP : 1; Blade size : 12-14"; capacity to cut round bar : 7"; Capacity to cut square bar : 5"; coolant pump; Automatic lifting and lowering arrangement; Vice; Machine belt guard</p> <p>The operation of is simple. It can cut the materials very fast even though the thickness or diameter is more. This type of machine tool can be operated at high speeds and even at low speeds.</p> | 1 No |
| 11 | Double Ended Motorized Bench Grinder | <p>Motor HP: 1; Three Phase; 440V;2800 rpm; Coolant pump; Wheel size : 250 x 25mm; Wheel guard</p> <p>A bench grinder is an appliance that is used to sharpen other tools. It is a must-have for your home workshop. Bench grinder has wheels that you can use for grinding, sharpening tools, or shaping some objects. Depending on the types and shape of the wheel, the use of a bench grinder can vary.</p> | 1 No |
| 12 | Double Ended Pedestal Grinder | <p>Motor HP: 1; Three Phase; 440V; 2800 rpm; Coolant pump; Grinding wheel: 200 x 40mm; Working table size : 185 x 175mm</p> <p>High surface finish and accuracy are produced.</p> <p>Ability to machine hard material.</p> <p>Less pressure can be applied to work.</p> <p>Ability to work at high temperature.</p> | 1 No |
| 13 | Hand Operated Hydraulic Press | <p>Capacity: 5tons; Dimension between columns: (LxB) 500 x 125mm; Distance between ram and bed maximum 600mm and minimum 75mm; Travel of ram: 100mm</p> <p>Cost-Cutting. They have a significant cost advantage over mechanical presses; if they experience breakdowns, replacement parts are inexpensive and the work is simple. ...</p> <p>Built-In Overload Protection.</p> <p>More Compact.</p> <p>Better Control Flexibility.</p> <p>Greater Versatility.</p> | 1 No |
| 14 | Puller | <p>Size: 4"; 3 legs reversible for internal and external use; Forcing screw, links and bolts</p> <p>A puller is a tool used to remove parts such as bearings, pulleys or gears from a shaft. They have legs, typically two or three which circle around the back or inside of a part and they also have a forcing screw which centres up against the end of a shaft</p> | 1 No |
| 15 | Hydraulic Jack | <p>Capacity: I t with hand pump</p> <p>It occupies less space, They are also less likely to Jam due to rust in the screw thread.</p> <p>It is highly effective with heavy loads.</p> <p>It lifts load with minimum effort.</p> <p>It is easier to use.</p> <p>It is bit lighter than screw jack.</p> <p>Load Capacity: 10 T</p> | 1 No |

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| | | Weight: 16 kg Dimension LxWxH : 57x30x24 cm | |
| 16 | Manual Chain Pulley Block | Capacity:0 to 10 Ton, 20 Ton Manual Chain Pulley Block have a compact shape and they are extremely lightweight which saves the time of mounting. Used for Loading and unloading. Capacity 0.52 - 20 ton Weight (Kilogram) 8 Max Lifting 9 m Test Load 0.75 ton | 1 No |
| 17 | Portable Blower | Specifications: Air volume: 4.5m ³ /min; Air pressure: 0-7.2 Kpa Consumes Very Less Space Portable & Very Versatile Size: 8"-16" (200 mm - 400 mm) Voltage: 220 - 240 V. Phase: Single phase. Speed: 2775 - 2900 rpm. Power: 185 - 1100 watts. Air Delivery: 1940-5000 cfm/ 3300-8500 cmh. | 1 No |
| 18 | Mechanical Transmission training Unit, Trolley Version with storage cabinet and toolkit | Electric Motor, 80 frame, 6 pole. (230V 50Hz 1ph) or (115V 60Hz 1ph) – 1No Worm and wheel gearbox – 1 No, Inline gearbox – 1 No, SPUR gear set-1 No, BEVEL gear set-1 No, Sprocket set-1 No, Twin Vee belt pulley set-1 No, Taper lock bush set (for use with vee belt pulleys)-1No, Timing belt pulley set-1No, Vee Belts-2Nos, Timing Belt-1 No, Chain-1No, Shaft-1No, Plumber (pillow) blocks-2Nos, Adjustable torque limiter-1No, Gear coupling-1No, Spider coupling—1No, 2Sets Motor/gearbox adjustment rails, 2Sets Motor/gearbox adjusters, Groundstock spacer blocks 5.00mm – 4Nos, Groundstock spacer blocks 5.25mm – 4Nos, Groundstock spacer blocks 5.50mm – 4Nos, Groundstock spacer blocks 5.75mm – 4Nos, Groundstock spacer blocks 6.00mm – 4Nos, Stainless steel shims 0.05mm –10Nos, Stainless steel shims 0.075mm –10Nos, Stainless steel shims 0.10mm –10Nos, Stainless steel shims 0.20mm –10Nos The safety features on the trainer include: Powerbreaker RCD plug on the mains cable (UK version only) Lockable isolator switch on the mains supply Lockable safety guards and two interlocked safety switches that cut motor power as soon as the hoods are lifted during operation Impact resistant safety guards The Toolkit comprises: - 1 Dial Test indicator. 1 Magnetic base for Dial Test Indicator. 1 19mm Combination spanner. 1 17mm Combination spanner. 2 13mm Combination spanners. 1 ‘T’ handle hex (allen) key 3mm. | 1 Set |

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| | | <p>1 'T' handle hex (allen) key 5mm. 1 'T' handle hex (allen) key 6mm. 1 150mm / 6 inch engineers steel rule. 1 300mm / 12 inch engineers steel rule. 1 600mm / 24 inch engineers steel rule. 1 50mm / 2 inch engineers square. 1 Nylon faced mallet. 1 Belt tensioner. 1 Padlock for electrical isolator / safety guards</p> | |
| 19 | Mechanical Training Bench (IMP-1) with TSA Two student add-on | <p>Frame Size (H x W x D): 48" x 60" x 29" (1219mm x 1524mm x 737mm)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Weight (approximate): 350 lbs (159 kg.) <input type="checkbox"/> Mechanical construction: <ul style="list-style-type: none"> <input type="checkbox"/> 1.5" (38mm) square anodized slotted aluminum frame <input type="checkbox"/> 1/4" aluminum top mounting plates (3), pre-drilled and elevated for mounting mechanical drive components <input type="checkbox"/> 1/4" aluminum slide-out shelves (8) with full-length ball-bearing slides and threaded fasteners for secure component storage <input type="checkbox"/> Full swiveling and locking casters <input type="checkbox"/> Drawer Full-suspension ball bearing slides <p>interior dimensions: 6"H x 12"W x 16"D (15.25 cm x 30.5 cm x 40.5 cm)</p> <p>Safety shield</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electrical construction: <ul style="list-style-type: none"> <input type="checkbox"/> Master power controller and disconnect switch with pilot lamp provides for lockout/tagout <input type="checkbox"/> Variable speed drive with adjustable speed trimpot <p>Power requirements: 240 VAC (+5%/-10%), 50-60 Hz, 8A</p> | 1 Set |
| 20 | Belt drive trainer | <p>Belt Drive Training System should be a heavy-duty, multi-functional belt drive training fixture that allows for convenient training in the identification, installation, tensioning, and alignment of common belt drive types found throughout industry. The benchtop training system is also packaged with hardware for applications related to multiple matches belts, fractional horsepower belts, positive drive belts, and variable pitch sheaves</p> <p>FEATURES & SPECIFICATIONS</p> <p>7-Gauge, formed-steel baseplate with provision for tabletop mounting. Welded aluminum motor and driven elements. High-durability powder coating, allowing for repeated use and rough handling. Multiple motor positions allow for demonstration of multiple tensioning requirements. Heavy-duty adjustable motor base for parallel tensioning. Provision for two-point tensioning using jacking bolts. Heavy-duty, flanged bearings allowing for variations in shaft misalignment. Fractional horsepower belts and sheaves, allowing for installation at two shaft centerline distances. Multiple type-A belt set, including tapered bushing, 2-groove sheaves,</p> | 1 No |

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| | | <p>matched belts and a mismatched belt example. Positive drive belt set including belt and sheaves. Sheave bushings, including QD and taper-lock varieties. Belt maintenance tool set. Provision for mounting on related bench and workstation products. Includes #201-002 - Wedge Belt and Sheave Set. Includes #208-015 - Magnetic Base/Dial Indicator Set. Product Dimensions (L x W x H) - 36in. x 13in. x 14in. (910 x 330 x 350 mm), 70lbs. (32kg) Shipping Dimensions (L x W x H) - 40in. x 15in. x 24in. (1020 x 380 x 610 mm), 136lbs. (62kg)</p> | |
| 21 | Chain Drive Trainer | <p>Chain Drive Training System should be a heavy-duty learning aide that allows for in-depth training in industrial chain drives, heavy/silent chains, and sprocket set usage. Through the use of a welded aluminum driver and actual industrial hardware, the trainer provides a complete introduction to chain nomenclature, assembly, disassembly, alignment, and maintenance.</p> <p>FEATURES & SPECIFICATIONS</p> <p>7-Gauge, formed-steel baseplate with provision for tabletop mounting Welded aluminum motor and driven elements Ground steel shafting Handwheel Multiple motor positions, allowing for establishment of several different chain lengths Provision for motor element jacking Heavy-duty flanged bearings allowing for variation of misalignment Chain, including 40 series standard, double-pitch and single-pitch double strand chain Connecting links, including cotter pin, spring clip and offset types Idler bracket assembly Six mixed diameter sprockets, with provision for keyed, taper-bore, taper-lock and QD hubs All components can be mounted on related bench and workstation products Chain breaker tool Chain puller Combination wrenches Allen wrench set Straight edge Magnetic angle indicator String Shim selection (four each of five sizes) Twelve connecting links of three varieties Two offset links (#40 series) Chain sample kit (six samples) Attachment chain sample Tool box Use/Exercise Guide, with 13 hands-on exercises Industrial Trades Training Manual, with chapter on chain drives (IPT) Packaging for shipment via motor freight</p> | 1 No |

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| | | <p>PRODUCT DIMENSIONS</p> <p>Product Dimensions (L x W x H) - 36in. x 13in. x 14in. (910 x 330 x 350 mm); 60lbs. (27kg)</p> <p>Shipping Dimensions (L x W x H)- 40in. x 15in. x 24in. (1020 x 380 x 610 mm) 132lbs. (60kg)</p> | |
| 22 | Combined mechanical trainer | <p>FEATURES AND SPECIFICATIONS</p> <ul style="list-style-type: none"> • 7-Gauge steel, modular baseplate. • Belt Drive Training Package, including primary training elements (driver, adjustable base), all belt and sheave components, specialized tools, and standard accessories as outlined under product • Gear Maintenance Training Package, including modular gearbox with bevel gear adapter assembly, all gears, bearings, specialized tools, and standard accessories as outlined under product • Coupling/Shaft Alignment Package, including motor mounting pads, jacking bars, specialized tools, and standard accessories as outlined under product • Coupling Package, including one elastomeric element coupling, one steel grid coupling and one chain-type coupling as outlined in the option list for product • Chain Drive Maintenance Package, including chain, sprockets, links, specialized tools, and standard accessories as outlined under product • Bearing Maintenance Package, including four stub shafts, two shaft mounting brackets, bearings seals, specialized tools, and standard accessories as outlined under product • Supplemental tool kit including additional fasteners and commonly used wrenches required for individual training modules • Five plastic storage boxes, allowing for storage of loose components when not in use. • Use/Exercise Guides for all applicable products <p>Product Dimensions (L x W x H) - 36in. x 13in. x 14in. (920 x 330 x 360 mm), 250lbs. (113kg)</p> <p>Shipping Dimensions (L x W x H) - 43in. x 36in. x 29in. (1100 x 920 x 740 mm), 420lbs. (181kg)</p> | 1 No |
| 23 | Coupling / Shaft Alignment Trainer | <p>Coupling/Shaft Alignment Trainer should be a heavy-duty, precision learning aid that allows for convenient, realistic training in shaft alignment. When paired with a variety of hands-on exercises, the training system creates a complete performance-based course in the maintenance of shaft alignment.</p> <p>FEATURES AND SPECIFICATIONS</p> <p>7-Gauge, formed-steel baseplate. Heavy-duty, welded aluminum driver and driven elements. Allows for alignment using all common methods and alignment tools. Multiple "motor" positions allow for use of many coupling types. Dimensions based on a common ANSI centrifugal pump. Rigid construction allows alignment to .001". Requires a minimal number of hand tools. Flanged bearings allow changes in angular and parallel misalignment. All fasteners easily accessible and replaceable.</p> | 1 No |

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| | | <p>Motor attachment points include steel threaded inserts. Replaceable shafts. Bent shafts are easily installed. 3/4" Diameter shafting with keyways. Uses size "A" shims. High-durability, powder-coated surfaces allow for repeated use and rough handling. Can be used with or without jacking bolts. All components can be mounted on related bench and workstation products. Packaging for shipment via motor freight.</p> <p>Product Dimensions (L x W x H) - 36in. x 13in. x 16in. (910 x 330 x 400 mm), 50lbs. (23kg)</p> <p>Shipping Dimensions (L x W x H) - 40in. x 15in. x 24in. (1020 x 380 x 610 mm); 102lbs. (46kg)</p> | |
| 25 | BSC Bearing Service Cart with two students Add-on | <p>Frame size (WxDxH): 36" x 28.5" x 48" (914mm x 724mm x 1219mm)</p> <p><input type="checkbox"/> Weight: Single-sided: 200 lbs. (91 kg.) Double sided: 275 lbs. (125 kg.)</p> <p><input type="checkbox"/> Mechanical construction:</p> <p><input type="checkbox"/> 1.5" (38mm) square anodized slotted aluminum frame <input type="checkbox"/> 1/4" (6.35 mm) aluminum top mounting plate <input type="checkbox"/> 1/4" (6.35 mm) aluminum slide-out shelves with full-length ball-bearing slides and threaded fasteners for secure component storage</p> <p><input type="checkbox"/> Full swiveling and locking casters <input type="checkbox"/> Drawer Full-suspension ball bearing slides</p> <p>interior dimensions: 6"H x 12"W x 16"D (15.25 cm x 30.5 cm x 40.5 cm)</p> <p>Power requirements: 240 VAC (+5%/-10%), 50-60 Hz, 8A</p> | 1 No |
| 26 | Pencil / Hand Grinder Collet Capacity | <p>Different types of pencil grinder (3, 6, 6 mm each) Pencil Grinder Tools are ideal for light deburring, deflashing, surface preparation, cleaning and finishing using the proper abrasive stones, abrasive mounted wheels and points, molded abrasives, and carbide burrs.</p> | 2 Nos |

Lot 2: Welding Equipment – 1 Set

| SL No | Name of the Item | Minimum Technical Specifications | Qty |
|-------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 | <p>Automatic Submerged Arc Welding machine</p> | <p><u>Technology</u> Rugged IGBT Based Inverter Technology SAW Welding Machines Built in CC/CV feature Suitable for SAW/ GMAW (MIG) / SMAW (Arc Welding) / Carbon Arc Gouging Incomparable Bead Quality in SAW Input Voltage compensation allows the user to use the machine with fluctuated voltage conditions</p> <p><u>CONSTRUCTION</u> <u>Welding Head</u> The welding head shall consist of wire feed mechanism incorporating a high torque DC geared motor, wire straightening and feed rollers, welding tip, vertical and horizontal adjustment mechanism and a flux hopper. The welding head has to be adjusted transversely and also vertically to bring the welding tip in correct position and swivel up to 45° for fillet seams in fillet position.</p> <p><u>Tractor Carriage</u> The tractor carriage shall be fabricated from steel sheets and provided with four wheels suitably insulated and for travelling on rails The trolley is to be driven by a high torque DC geared motor with the help of chain and sprocket arrangement, giving power to the four wheels, thereby avoiding any slippage of the wheels The trolley has to support the cross/vertical beam fitted with welding head on one side and control box on the opposite side, which can be fixed on the top of the trolley. Capacity of Tractor = 60 Kgs. (max.) without wire roll A suitable clutch arrangement has to be provided for disengaging the geared motor for manual pushing. And also handles for pushing and pulling the system manually Rails made out of steel sections with suitable reinforcements, in segments of 2000 mm (in length) with suitable end couplers to build a welding track length of 12,000 mm. (To offer for rails of six segments each of 2000 mm long with couplers)</p> <p><u>Control Panel</u> (The control panel shall incorporate the following): The controls shall be thyristorised for traction and wire feed, speed The control panel shall be mounted opposite to the welding head and able to be fixed at a convenient angle for easy reading of parameters Meters for reading welding current, voltage and carriage speed Potentiometer for wire feed and carriage speed adjustment Push buttons for upward and downward inching of the electrode wire Switches for start and stop of welding Forward, off and reverse movement of the carriage Spot light (24V) for welding with the switch in the panel and indication lamp for welding 'ON'</p> | 1 No |

The panel for thyristor control equipment shall take an input of 42 Volts or 110 Volts and include PCBs for wire feed and carriage speed controls (thyristor control system) D.C. supply voltage for motors, control fuses and switching socket

Technical Data

Welding speed - 120 mm to 1800 mm/min
 Wire feed speed - 2.5 to 10 M/Min
 Wire diameter - 2.4 mm to 6.3 mm
 Max. Welding Current: 1140 (At 60% duty cycle) 1000 Amps(At 100% duty cycle)
 Capacity of flux container - 5.0 Kg. (min.)

Welding Head Adjustment

vertical traverse -Min. 250 mm
 horizontal traverse to weld seam - Min. 250 mm

Angular displacement

along the vertical axis - 360°
 vertical plane traverse to weld seam - 45°
 vertical plane parallel to weld seam - 45°
 Welding Current Range - 150 to 1200 Amps
 Duty Cycle - Continuous, even for 1200 Amps
 Open Circuit Voltage: 65 - 72 Volts (DC)
 Welding Voltage: 20 to 46 Volts DC
 Characteristics full wave constant potential 20
 Input Power Supply: 415 ±10% V, 50 ± Hz, 3-phase AC, 3 - wire system
 Insulation Class - H
 Design Feature Fully thyristorised with six SCRs
 The power source shall be provided with
 100 % copper or superior quality aluminium winding
 Ammeter and Voltmeter (either analog or digital)
 Hand-held remote control unit for welding current & voltage variation
 two numbers of lifting hook for EOT crane
 four numbers castor wheels
 electrostatic powder coating for outer casing
 swivel base handle for easy maneuverability
 two numbers of plug points for connecting handlamps of rating 24 V/40W with MCBs for protection

The control, welding and earth cables connecting the power source to the welding unit shall have a length of twenty metres.

The control voltage shall be 110 V AC or 42 V AC for the wire-feeder / tractor drive unit / voltage adjustments..

| | | | | | |
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| 2 | AC/DC pulse TIG welder set 415 V, AC 3 Phase max | Power Source: Inverter Digital Technology GTAW ACDC Welder | | 1 No | |
| | | Feature | Description | | Value |
| | | Mains connection voltage | 3~ 50/60 Hz | | 380...460 V ±10 % |
| | | Maximum supply current | | | 16...12 A |
| | | Fuse | | | 16 A or less |
| | | Open circuit voltage | MMA | | 45 - 60 V |

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| (average) | | |
| Rated maximum output at 40 °C | 40 % TIG | 300 A / 22 V |
| (Duty cycle and process specified in the next column) | 60 % TIG | 230 A / 19.2 V |
| | 100 % TIG | 190 A / 17.6 V |
| | 40 % MMA | 250 A / 30 V |
| | 60 % MMA | 230 A / 29.2 V |
| | 100 % MMA | 190 A / 27.6 V |
| Range of output | TIG | 3 A / 1 V ... 300 A / 38 V |
| | MMA | 10 A / 10 V ... 250 A / 39 V |
| Power factor, λ | 400 V, MMA 250 A / 30 V | 0.9 or better |
| Efficiency, η | 400 V, MMA 190 A / 27.6 V | min 86% |
| Idle power | TIG | 20 W |
| Operating temperature range | | -20...+40 °C |
| Storage temperature range | | -20...+60 °C |
| EMC class | | A |
| Degree of protection | | IP23S |
| Voltage supply for cooling unit | Ucu | 380...460 V |
| Recommended generator power (min) | Sgen | 20 kVA |
| Wireless remote | Transmitter frequency power | 2.4 GHz Bluetooth, |
| Wired communication type | Remote | Analog |
| | CAN BUS | Remote-Bus or equivalent |
| Stick electrode diameters | ϕ mm | 1.6...4.0 mm |
| Standards | | IEC60974-1,-3,-10 |
| | | IEC 61000-3-12 |
| | | AS 60974.1-2006 ⁽³⁾ |
| | | GB 15579.1 |
| | | |
| Functions TIG: | TIG HF Start, TIG LIFT Start & TIG Spot should be available | |
| Pre Flow :- | 0 to 10 Sec | |
| Start Current Adjustment | 5 - 300% or better | |
| Up Slope | adjustable 0-5 Secs (Steps of 0.1sec); | |
| Down Slope | 0.1 – 15 sec or better | |
| Post Flow | 0 to 30 sec | |
| Hot Start level | - 80% to + 100% or better | |
| Hot Start time | 0.1 sec to 9.9 sec | |

| | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------|
| TIG Pulse Frequency | 0.2 hz to 300 Hz or better | |
| Double Pulse Feature | Must Be available | |
| 2/4 stroke | Must Be available | |
| Memories | 99 memory. | |
| OEM | | Provide OEM documents |
| IoT Based Features | | This is mandatory |
| Parameter Value | Value | |
| Current mode | DC-/ DC+ /AC/ MIX | |
| AC Waveform | Sine / Optima / Square | |
| AC Frequency | 30 Hz ... 250 Hz or better | |
| AC+ / AC- balance | Min/Max = -60 %... 0 % | |
| MIX TIG AC (time) ratio | Min/Max = 10 %... 90 %,step 1 % | |
| MIX TIG cycle time | Min/Max = 0.1 s... 1.0 s, step 0.1 s | |
| | | |
| MMA settings: | | |
| Hot start | -10 ... +10, step 1 (Default = 0) | |
| Arc force | -10 ... +10, step 1 (Default = 0) | |
| MMA antifreeze | OFF / ON (Default = OFF) | |
| VRD mode | OFF / ON (Default = OFF) | |
| Technical Features: - | | |
| 1. Power Source: - | | |
| It shall have error code display for maintenance purpose (Error diagnostic function). | | |
| Auto cut off built in the power source in case of over current. Over heat, under voltage, phase absence protections, phase failure indicator shall be provisioned. Suitable indication/alarm on the above failure should be provide. | | |
| Protection circuit for prevention of frequent failure of power device (IGBT) shall be provided. | | |
| It should have infinitely variable stepless current control for the entire range of output current. | | |
| The machine should support both TIG and MMA welding with AC/DC output having control feature of AC balancing and frequency control. | | |
| Pre-set wave form control in AC welding, Sine, square and optima wave form, must be provisioned. | | |
| The machine should be having double pulse feature which allows pulse welding at two current levels for better travel speed and lower heat input in dc tig mode. | | |
| It should be capable of micro tacking function controlling the tacking timing in the range of milliseconds (1- 200ms). | | |
| The machine should have capability to change the welding current during welding without extinguishing of the arc. | | |
| The machine should have function to set the search arc and tail arc while performing. | | |

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| | | Then Machine must be Compatible with Water Cooling unit | |
| | | Display must be compatible with following selection | |
| | | DISPLAY Shall be Compatible with selection of material you are about to weld Fe / SS /AL | |
| | | DISPLAY Shall be Compatible with Selection of Welded material thickness from 0.5mm to 10 mm. | |
| | | DISPLAY Shall be Compatible with selection of Joint Type:- Butt Joint / Corner Joint / edge Joint / Lap Joint / Fillet Joint / Tube Joint / Tube +Plate Joint | |
| | | DISPLAY Shall be Compatible with selection of Joint Position:- PA /PB/PC/PD/PE/PF/PG | |
| | | Compatible with Water Cooling unit as per below specification | |
| | | Cooling Unit minimum specifications | |
| | | Feature | Value |
| | | Connection voltage | 220...460 V AC, 1~/3~ |
| | | Maximum rated supply current | 1.0 A |
| | | Rated cooling power at 1 l/min | 0.9 kW |
| | | Cooling power at 1.6 l/min | 1.0 kW |
| | | Recommended coolant | MPG 4456 |
| | | Coolant pressure (max) | 0.4 MPa |
| | | Tank volume | 3.0 l |
| | | Operating temperature range * | -20 ... +40 °C |
| | | Storage temperature range | -20 ... +60 °C |
| | | EMC class | A |
| | | Degree of protection ** | IP23S or better |
| | | External dimensions L x W x H mm | 615 x 206 x 268 mm |
| | | Weight without accessories | 12.5 kg |
| | | Standards | IEC 60974-2 |
| | | | IEC 60974-10 |
| 3 | Arc Welding Machine | Technology | IGBT based Digital Inverter Technology |
| | | Input Power Supply | 415 V +/- 10% , 3 Ph 50 Hz AC |
| | | Rated Power at Max Current | 15 KVA - 18 KVA 60% duty cycle |
| | | Maximum Supply Current | 27 A or better |
| | | Power Factor | 0.9 or better |
| | | OCV | 47 - 65 V |
| | | Welding Current & Voltage | 20A/12V - 500A or more/43V |
| | | Output Current @ 60% Duty Cycle (10 Min) | 400 Amps or more |
| | | Output Current @ 100% Duty Cycle (10 Min) | 390 Amps or more |
| | | Protection Class | IP 23S or better |
| | | Insulation Class | H |
| | | EMC Class | A |
| | | Fan on Demand | Inbuilt |
| | | Digital Error Code | OVER Temp, Over Voltage, Under Voltage, Wire Feeder Motor Over Current |
| | | Standards | IEC 60974-1 , IEC 60974 -10 |
| | | Operating Temperature | (-10°C to +40°C or better) |
| | | Carater Fill Option | Must Be Available |
| | | Auto / Manual or 2T / 4T Selection | Must Be Available. |
| | | | 1 No |

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| | | Switch | | |
| | | Burn Back Option | Must Be available | |
| | | Hot Start Option | Must Be available | |
| | | Calibration Between Power Source & Wire Feeder | Must Be Available | |
| | | Carbon Arc Gouging Facility | Must Be Available | |
| | | Password Locking for Parameter Setting | Must Be Available | |
| | | Wire feeder Specification | | |
| | | Wire Feeder Unit | 4 Roll Drive , Fully Enclosed Wire feeder made by insulated & non-inflammable material. | |
| | | Norms | IEC 60974 -5 | |
| | | Gun Connection | Euro | |
| | | Feeder Operation Voltage | 24V | |
| | | Protection Class | IP 23S | |
| | | Wire Feeding Speed | 0 - 25m/min | |
| | | Wire Feeder suitable for filler Wire | Solid 0.6 - 1.6 mm & FC 0.8 - 2.0 mm | |
| | | Wire Spool Dia & Weight (max) | 300 mm & 20Kg | |
| | | Wire Feeding Voltage & Current | Must Be available in wire feeder | |
| | | Wire Inching switch (to avoid gas wastage) | Must Be available | |
| | | Gas Test Switch (to avoid wire wastage) | Must Be available | |
| | | Technical Data Welding Torch | | |
| | | Connection | EURO | |
| | | Colling | Air | |
| | | MIG Torch Duty Cycle | 60% @ 500 A for Mixed gas | |
| | | | 60% @ 550 A for CO2 | |
| | | OEM | Provide OEM documents | |
| | | IOT Based Features | This is mandatory | |
| | | | | |
| 4 | C02 / MIG Welding Machine 415 VAC | 2.00 TECHNICAL SPECIFICATION | | 1 No |
| | | 2.01 Type | Digital Microprocessor controlled software based IGBT inverter type power source. | |
| | | 2.02 Shielding medium | Argon or CO2 or Argon/CO2 gas mixture | |
| | | 2.03 MIG Welding Current | 20 A/14 V - 400 A/50V | |
| | | 2.04 MMA Welding Current | 15 A/20 V - 400 A/58V | |
| | | 2.05 Rated duty cycle | 60% (minimum) | |
| | | 2.06 Welding Output | 400 A (minimum) rating at 60% duty cycle (10 minutes) at 40 °C | |
| | | 2.07 Welding Output | 320 A (minimum) rating at 100% duty cycle (10 minutes) at 40 °C | |
| | | 2.08 Rated power @ 100% | 11 - 14 kVA | |
| | | 2.09 Open circuit Voltage | 76 - 92 V DC | |
| | | 2.10 Wire Feed Speed | 0.5 to 30 m/min | |
| | | 2.11 Idle power without cooler and wire feeder (MIG) | 45 - 52 W | |
| | | 2.12 Type of Cooling | Forced air cooled | |
| | | 2.13 Degree of Protection | IP23S | |
| | | 2.14 Input Supply Variation | 380 - 460 V ±10 % 3~,50/60HZ | |
| | | 2.15 EMC class | A | |

| | | |
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| 2.16 | Power Factor at max. current | 0.80 Min |
| 2.17 | Efficiency at max. current | Min 85 % |
| 2.18 | Recommended generator power (min) | 25 kVA |
| 2.19 | Output display | Digital |
| 2.20 | Wireless communication type | 2.4 GHz WiFi & Bluetooth |
| 2.21 | Wired communication type | Ethernet & USB |
| 2.22 | Standards | IEC 60974-1, -10 |
| 2.23 | OEM | Provide OEM documents |
| 2.24 | IOT Based Features | This is mandatory |
| 3.00 | Working Condition : | |
| 3.01 | Continuous heavy duty welding in dusty fabrication shop | |
| 4.00 | TECHNICAL FEATURES | |
| 4.01 | The power source should be trolley mounted, sturdy, dust proof and ergonomic construction. | |
| 4.02 | The power source should have excellent tolerance of supply voltage fluctuations and should be suitable for generator use | |
| 4.03 | The Power source should have both constant current and constant voltage characteristics | |
| 4.04 | The machine should be capable of connecting to internet via wi-fi for Industry 4.0 | |
| 4.05 | The machine should be able to operate in two knob control for MIG/MAG welding where current and voltage can be adjust separately | |
| 4.06 | In-built synergic MIG/MAG welding programs for delivering better arc characteristics for base metals like carbon steels, alloy steels, stainless steels, Aluminium etc. and for thin to heavy thickness joints. | |
| 4.07 | There should be provision for selecting the welding power by wire feed speed or current or thickness of the material in synergic MIG/MAG welding | |
| 4.08 | The machine shall have single knob synergic control through in-built MIG/MAG welding programs. Base Material, filler wire metal, wire diameter and shielding gas composition should be selectable by the welder. When Wire feed speed or current is selected other parameters should be automatically should be set by the synergic control system | |
| 4.09 | The machine shall have synergic pulse welding capability with in-built MIG/MAG welding programs. Base Material, filler wire material, wire diameter and shielding gas composition should be selectable by the welder. When Wire feed speed or current is selected other pulse parameters should be automatically set by the synergic control system | |
| 4.10 | Machine should support MIG brazing providing the best arc characteristics | |
| 4.11 | Machine should support weld cladding with effective control over dilution | |
| 4.12 | Machine should support MMA welding of all type of electrodes. | |
| 4.13 | Machine shall have special feature for optimal control of the arc length for delivering focused arc for deeper penetration and higher travel speed by digital control. | |
| 4.14 | Machine should support special feature/ software to deliver higher | |

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| | | performance for MS and stainless steel thin to medium sheet positional welding with reduced heat input. |
| 4.15 | | Machine should support special feature/ software to deliver higher performance root welding of MS and stainless steel jobs. |
| 4.16 | | Machine should support special feature/ software to deliver higher performance steel welding to control and minimize spatter level in the globular metal transfer current range. |
| 4.17 | | Machine should support special feature/software for advanced control to deliver the set current even the stick out length varies up to 30mm. |
| 4.19 | | The control panel should be capable of displaying Welding Procedure Specification in digital format with the usage of welding management software |
| 4.20 | | Warning and operational LED indications for over temperature. |
| 4.22 | | Auto-Cut off device in-built in the power source in case of overheating. |
| 4.23 | | Delayed display of set parameter values to check the actual welding parameters after welding. |
| 4.24 | | Function to check the parameters of the last 10 welds at any point of time. |
| 4.25 | | Error code display for maintenance purpose (Error diagnostic function) and easy rectification of issue. |
| 4.26 | | The machine should store and display the error occurred previously and its point of time |
| 4.27 | | The machine should have minimum 100 memory channel to save welding jobs. |
| 4.28 | | Dynamics control for varying the rate of change of the short circuit current for fine tuning of the arc characteristics |
| 4.29 | | Crater fill function for avoiding crater defects |
| 4.30 | | Hot start / soft start functionality for controlling starting current |
| 4.31 | | Slow wire feeding before arc ignition for easy arc stabilization. |
| 4.32 | | It should have function to switch the output current level during welding without extinguishing the arc. |
| 4.33 | | Pre-gas and post-gas Control for better weld bead protection. |
| 4.34 | | Ignition of the arc should be smooth and spatter free by touch sensing. |
| 4.35 | | The machine should have Voltage Reduction Device for safety during MMA welding and LED provisioned in the power source for operational indication. |
| 4.36 | | Machine should be connectable to android based mobile application for software updates, License update, welding program update and backups |
| 4.37 | | The Power source should be capable to upgrade at high power level of 500A by software upgradation. |
| 4.38 | | The power source should be able to connect two wire feeders simultaneously. |
| 5.00 | | Wire Feed Unit:- |
| 5.01 | | Light weight, compact and ergonomic wire feeder with twin motor four roller drive. Suitable for continuous smooth wire feeding with wire dia 0.8 mm, 1.2mm, 1.6 mm Solid/Flux Cored Wire. The rollers should be easily attachable & removable from the wire feeder without any special tools |
| 5.02 | | Wire spool mounting arrangement with standard wire spools (Maximum 300mm spool) properly covered or housed inside the wire feed unit with see through glass to prevent direct contact from moisture and dirt. |
| 5.03 | | Wire inch button for feeding the wire without releasing gas. |

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| 5.04 | Wire Retraction Mechanism for pulling of the filler wire back. | |
| 5.05 | Gas test button to check gas flow rate before welding. | |
| 5.06 | Digital display of major weld parameters like current, voltage, wire speed, channel number and other settings | |
| 5.07 | Wire feeder must be Suitable for TOP loading of Spool design for east loading. | |
| 5.08 | Cabinet lighting for poorly lit conditions | |
| 5.09 | The cooling unit should compliant to standards IEC 60974-5, 10 | |
| 5.10 | Wire feeder should be compatible with sub feeder | |
| 6.00 | Welding Torch :- | |
| 6.01 | Ergonomically designed torch with 3.5 m flexible & light to handle cable. | |
| 6.02 | Torch will be fitted with 2/4 step on-off switch and remote control on torch to adjust parameters and also to change the channels | |
| 6.03 | The Torch duty cycle should be of 100% Duty cycle at 420 A | |
| 6.04 | LED lighting available for poorly lit conditions | |
| 7.00 | Compatible with Sub Feeder / Remote Feeding system | |
| 7.01 | In view of reach to remote areas where approach of std wire feeder if difficult or impossible the welding plant must have provision for distance wire feeder system without shifting the main wire feeder from the power source through an extension cable assembly, however, it should be possible to use a std traditional mig welding torch of international Std with EURO Connection having length 3.5/4.5 mts . | |
| 7.02 | The Length of extension should be at least 10 mts. The motion of feeler wire through the entire length should be synchronized for smooth feeding through bend and loops of extension cable There should be control adjustments for welding current and welding Voltage at the torch connection end within the extended remote feeding system. | |
| 7.03 | The remote feeding System should have the same ratings, wire sizes, class of insulation and speed range of wire feeder. However, 2 roll drive or 4 roll filler wire drive mechanism shall be acceptable. | |
| 8.00 | WIRELESS CONTROL PAD | |
| 8.01 | Operating voltage | 12V |
| 8.02 | Operating temperature range | -20...+40 °C |
| 8.03 | Degree of protection | IP54 |
| 8.04 | Typical battery operation time | 15 - 24 h |
| 8.05 | Battery type | Li - ion |
| 8.06 | Data Communication | Combo cable port for Data and Power transfer, NFC & Bar Code reader must be available. |
| 8.07 | Wireless communication type - 2.4 GHz Bluetooth | |
| 8.08 | Transmitter frequencies and powers :- | |
| 8.09 | 2400-2483.5 MHz 14 dBm | |
| 8.10 | 13.56 MHz -1.3 dBμA/m | |
| 8.11 | Typical wireless communication range - max15 Mts | |
| 8.12 | communication type Wired -USB | |
| 8.13 | Display Type - TFT Led | |
| 8.14 | Display Size - 5.7' | |
| 8.15 | Standards :-IEC 60950-1, EN 62368-1EN 300 328 v2.1.1, EN 300 330 v2.1.1 • EN 301 489-1v2.1.1 | |

| | | | | |
|----------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------|
| | | | <ul style="list-style-type: none"> • EN 301 489-3v2.1.0 • EN 301489-17v3.1.1 | |
| | | 9.00 | Technical Data Welding Torch | |
| | | 9.01 | MIG Torch Duty Cycle | |
| | | 9.02 | Connection | |
| | | 9.03 | Cooling | |
| | | | | |
| 5 | Manual plasma cutting system | Power source | IGBT Inverter based | 1 No |
| | | Maximum Cutting Capacity Quality Cut | 20mm | |
| | | Maximum Cutting Capacity Severance Cut | 40mm | |
| | | Material to Cut | Ferrous & Nonferrous metals | |
| | | Input Supply | 415 V 3 ph, 50 Hz | |
| | | Input rating | 16 - 18 KVA | |
| | | Output current | 10 - 100 Amps Stepless Adjustable | |
| | | OCV | 320 V DC | |
| | | Duty Cycle | 100%- 60A | |
| | | Compressor HP & Pressure | Min 1.5 HP / 5.0 - 5.5 Kg/sq. cm | |
| | | Air Flow | 175 - 220 L / min | |
| | | Plasma Head Technology | Advanced one | |
| | | General features | | |
| | | -Current Control Knob | | |
| | | -Air pressure LED Indicator | | |
| | | -Air pressure adjusting /control knob | | |
| | | -Mode selection | | |
| | | -Power On Indicator | | |
| | | -Gas test / Set position | | |
| | | -Insufficient Air Pressure warning Indicator | | |
| | | -Over temperature warning | | |
| | | -Fault Error Indicator | | |
| | | -The power source should have provision to be integrated with CNC profile cutting machine | | |
| | | -The machine must have provision for straight head torch for automated application with | | |
| | | Hand Torch | Minimum 8 m length | |
| | | | | |
| 6 | Mig Welding Torch Gas Cooled - Cap | 180A/250A/300A | | 1 No |
| | | Gas-cooled torches enable welders to generally work without stopping. This can prove especially important when you're working on a small, precise weld bead that needs to be continuous. If your torch heats up, you'll either have a hard time keeping your hand steady or you may need to stop too soon Weight, 400 - 600 g ; Nozzle Size, 9.5 to 12 mm ; Output Current, 150A-180A | | |
| 7 | Water Cooled - Cap | 300A/500A | | 1 No |
| | | The flashier option for temperature management, liquid cooling offers incredible performance combined with a visual appeal that no other cooling system can match. In these systems, liquid (typically water) transfers heat away from components and is generally much better at heat management than air alone. Dimension(W x D x H) :- 760 mm x 600 mm x 1670 mm Cap Size :- 20mm to 85mm Max. Line Speed :- 20 feet / minute MOC :- AL / MS | | |
| 8 | Pneumatic Spot Welding | Input supply | Volt | 1 No |
| | | Phase | No | |
| | | Rating @ 50% duty cycle | KVA | |
| | | | 415±15% | |
| | | | 2 or 3 phase | |
| | | | 40 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|---------|--------------|----|--------------------|---------------------------------|-----|----|-----------------------------------------|----|-----|---------------------------------------------------|--------|------------|--------------------------------------------------------|--------|------------|-------------|-------|-----|-----------------|--------------------|----------------------------------------------|-----------------------------------------|-----|------------|----------------------------------------|----------|-------|-------------------------------|-----------------|--------|------------------------------|------|-----|--------------------------------------|---------|---|-----------------------------|----|--------------|----------------------------------|----|---------|-----------------------|----|-----|------|
| | machines | <table border="1"> <tr><td>Nominal throat clearance</td><td>mm</td><td>250</td></tr> <tr><td>Throat depth</td><td>mm</td><td>450</td></tr> <tr><td>Maximum electrode stroke</td><td>mm</td><td>40</td></tr> <tr><td>Maximum available short circuit current</td><td>KA</td><td>12</td></tr> <tr><td>Mild steel welding thickness range (min. to max.)</td><td>2 x mm</td><td>0.8 to 4.0</td></tr> <tr><td>Stainless steel welding thickness range (min. to max.)</td><td>2 x mm</td><td>0.6 to 3.8</td></tr> <tr><td>Insulation</td><td>Class</td><td>H</td></tr> <tr><td>Current control</td><td>-</td><td>By means of 3-6 position off load tap switch</td></tr> <tr><td>Transformer cooling</td><td>-</td><td>Air cooled</td></tr> <tr><td>Cooling for arms and electrodes</td><td>-</td><td>Water</td></tr> <tr><td>Main supply copper cable size</td><td>mm²</td><td>25</td></tr> <tr><td>Main disconnection switch</td><td>Amp</td><td>100</td></tr> <tr><td>Water at maximum temperature of 300C</td><td>Lit/min</td><td>4</td></tr> <tr><td>Dimensions (HxLxW)</td><td>mm</td><td>1450x840x410</td></tr> </table> | Nominal throat clearance | mm | 250 | Throat depth | mm | 450 | Maximum electrode stroke | mm | 40 | Maximum available short circuit current | KA | 12 | Mild steel welding thickness range (min. to max.) | 2 x mm | 0.8 to 4.0 | Stainless steel welding thickness range (min. to max.) | 2 x mm | 0.6 to 3.8 | Insulation | Class | H | Current control | - | By means of 3-6 position off load tap switch | Transformer cooling | - | Air cooled | Cooling for arms and electrodes | - | Water | Main supply copper cable size | mm ² | 25 | Main disconnection switch | Amp | 100 | Water at maximum temperature of 300C | Lit/min | 4 | Dimensions (HxLxW) | mm | 1450x840x410 | | | | | | | |
| Nominal throat clearance | mm | 250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Throat depth | mm | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum electrode stroke | mm | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum available short circuit current | KA | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mild steel welding thickness range (min. to max.) | 2 x mm | 0.8 to 4.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stainless steel welding thickness range (min. to max.) | 2 x mm | 0.6 to 3.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Insulation | Class | H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current control | - | By means of 3-6 position off load tap switch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transformer cooling | - | Air cooled | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cooling for arms and electrodes | - | Water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main supply copper cable size | mm ² | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main disconnection switch | Amp | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water at maximum temperature of 300C | Lit/min | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimensions (HxLxW) | mm | 1450x840x410 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Seam Welding machine | <table border="1"> <tr><td>Input supply</td><td>Volt</td><td>415±15%</td></tr> <tr><td>Phase</td><td>No</td><td>2 Lines of 3 Phase</td></tr> <tr><td>Nominal rating @ 50% duty cycle</td><td>KVA</td><td>40</td></tr> <tr><td>Throat depth standard</td><td>mm</td><td>460</td></tr> <tr><td>Throat gap (min)</td><td>mm</td><td>300</td></tr> <tr><td>Standard stroke</td><td>mm</td><td>100</td></tr> <tr><td>Switch fuse</td><td>Amp</td><td>125</td></tr> <tr><td>Air pressure</td><td>Kg/cm²</td><td>3-6</td></tr> <tr><td>Electrode force at 5 kg/cm²</td><td>KGF</td><td>450</td></tr> <tr><td>Water supply at 2.5 kg/cm²</td><td>Ltr./min</td><td>20</td></tr> <tr><td>Upper electrode dia/thick</td><td>mm</td><td>250/12</td></tr> <tr><td>Air consumption/stroke (Max)</td><td>Ltr.</td><td>1.6</td></tr> <tr><td>Drive motor dc</td><td>HP</td><td>1</td></tr> <tr><td>Welding capacity mild steel</td><td>mm</td><td>1+1</td></tr> <tr><td>Welding capacity stainless steel</td><td>mm</td><td>0.8+0.8</td></tr> <tr><td>Normal working height</td><td>mm</td><td>900</td></tr> </table> | Input supply | Volt | 415±15% | Phase | No | 2 Lines of 3 Phase | Nominal rating @ 50% duty cycle | KVA | 40 | Throat depth standard | mm | 460 | Throat gap (min) | mm | 300 | Standard stroke | mm | 100 | Switch fuse | Amp | 125 | Air pressure | Kg/cm ² | 3-6 | Electrode force at 5 kg/cm ² | KGF | 450 | Water supply at 2.5 kg/cm ² | Ltr./min | 20 | Upper electrode dia/thick | mm | 250/12 | Air consumption/stroke (Max) | Ltr. | 1.6 | Drive motor dc | HP | 1 | Welding capacity mild steel | mm | 1+1 | Welding capacity stainless steel | mm | 0.8+0.8 | Normal working height | mm | 900 | 1 No |
| Input supply | Volt | 415±15% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase | No | 2 Lines of 3 Phase | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal rating @ 50% duty cycle | KVA | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Throat depth standard | mm | 460 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Throat gap (min) | mm | 300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Standard stroke | mm | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Switch fuse | Amp | 125 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Air pressure | Kg/cm ² | 3-6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Electrode force at 5 kg/cm ² | KGF | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water supply at 2.5 kg/cm ² | Ltr./min | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Upper electrode dia/thick | mm | 250/12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Air consumption/stroke (Max) | Ltr. | 1.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drive motor dc | HP | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Welding capacity mild steel | mm | 1+1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Welding capacity stainless steel | mm | 0.8+0.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal working height | mm | 900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | A/C, D/C Welding Rectifiers | <p>Input supply voltage 380/415/440</p> <p>Welding power supplies primarily serve as devices that allow a welder to exercise control over whether current is alternating current (AC) or direct current (DC)</p> <p>Three Phase 400 / 600 Amp Arc Welding Rectifier, Input Voltage: 415v Ac 3 Phase Supply ; Power, 23 KVA / 38 KVA Thyristorised Welding Rectifier ;</p> <p>Cooling Type</p> | 1 No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | AC Arc Welding transformer | <p>30-300 AMPS</p> <p>This welder is approximately maintenance free.</p> <p>Operating expenses are fairly sensible.</p> | 1 No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | <p>Initial cost is commonly very low. This is perfect for farm repair Supply Voltage 220 Volts, 1 Phase - Instantaneous arc ignition - 2 Stroke / 4 Stroke - Gas Economiser. Dimension (L x W x H) mm 425 X 290 X 300 mm</p> | |
| 12 | Fully Insulated Electrode | <p>Holder capacity 400 - 600 AMP Can be Used with AC Supply. Helps in Maintaining the Arc. Shielding the Molten Metal from Oxidization. Can be Used for High Welding Current. electrode holders available: the 200A, 400A and 600 A. Range Welding Cable sizes 35mm², 50mm² and 70mm²</p> | 5 Nos |
| 13 | Ground Clamp required for electric arc welding | <p>800 Amp High-frequency signals tend to radiate away from the welding area. These signals may cause interference with nearby radio and television reception or other electrical equipment. One way to minimize high-frequency signal radiation is to ground the welding circuit. Size 150mm x 70mm x 25mm Material Stainless Steel Current Range 15 A Packaging Type Packet Equipment Type Copper Bonded Grounding Rod</p> | |
| 14 | Welding consumables | <p>Welding Holder (400-600 A), Welding Cable (Required as per length), Cable lux, Cable Earthing (Cable and strip), Welding screen(white glass, black glass), Hand gloves, Apron, Chipping hammer Welded joint has high strength, sometimes more than the parent metal. Different material can be welded. Welding can be performed anyplace, no need enough clearance. They give smooth appearance and simplicity in design.</p> | As needed for 30 students batch |
| 15 | Oxy-Acetylene Gas Regulator Oxygen | <p>15Mpa- 0.03-1.2Mpa Acetylene 3Mpa - 0.01-0.15Mpa Oxygen and acetylene regulators reduce pressure and control the flow of gases from the cylinders.</p> | 2 Nos |
| 16 | Welding tool Kit | <p>Cutting torch, Gas Regulator, Welding Nozzles, Cutting Nozzles, Rubber Tube, Binkers, Copper Brush, Lighter, Spanner, Nozzle Cleaner Portability – these materials are very easy to transport.</p> | 2 Nos |

Lot 3: Items required for various Hydraulics Experiments (Open Circuit) – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 | Apparatus for Verification of Bernoulli's Theorem complete with Collecting Tank | The Bernoulli test apparatus consists of a tapered duct (venturi), a series of manometers tapped into the venturi to measure the pressure head, and a hypodermic probe that can be traversed along the center of the test section to measure the total head. | 1 No |
| 2 | Reynolds's Apparatus Complete with Collecting Tank | The apparatus consists of a glass tube with one end having bell mouth entrance connected to a constant head water tank and at the other end a valve is provided to vary the flow rate. The tank is of sufficient capacity to store water for conducting the test. | 1 No |
| 3 | Determination of Losses in pipeline | Determination of Losses in pipeline Due to Sudden Enlargement, Contraction etc. with collecting tank and differential manometer Head loss due to sudden contraction=head loss upto vena contracta + head loss due to sudden enlargement. | 1 No |
| 4 | Determination of Critical Velocity all accessories | Critical Velocity refers to the Velocity of the fluid when the flow changes from laminar to turbulent flow. Formula of Critical Velocity is: $VC = Re \frac{\eta}{\rho r}$ Where $Re =$ Reynolds number $\eta =$ coefficient of viscosity $\rho =$ density of fluid $r =$ radius of tube Reynolds number's dimensional formula $(Re) = \frac{M^0L^0T^0}{Coefficient\ of\ viscosity\ dimensional\ formula\ (\eta) = \frac{M^1L^{-1}T^{-1}}{Fluid\ Density\ Dimensional\ Formula(\rho) = \frac{M^1L^{-3}T^0}{Dimensional\ Formula\ of\ radius\ (r) = \frac{M^0L^1T^0}}$ | 1 No |
| 5 | Determination of CD,CV & CC Orifices | Coefficient of discharge (C_d) = Coeff. of flow/velocity (C_v) x Coeff of contraction (C_c). | 1 No |
| 6 | Forces of Jet Apparatus | HM 150 base module | 1 No |
| 7 | Apparatus for Determination of Discharge & Coefficient of Discharge | Orifice meter is the cheapest available device for measuring flow/discharge rate | 1 No |
| 8 | Collection tank with two compartment | to purify the lighter sludge as it moves from one chamber to the other | 1 No |
| 9 | Venturimeters (Brass) of different sizes | 25 mm, 38 mm, 50 mm High-pressure recovery. Low permanent pressure drop. High coefficient of discharge. Smooth construction and low cone angle help to solid particles flow through it. It can be installed in any direction horizontal, vertical and inclined. More accurate than orifice and flow nozzle. | 1 No |
| 10 | Orifice Meter (Cast Iron Body Brass Plates) of different sizes | 25 mm, 38 mm, 50 mm The orifice meter can be easily maintained. Measures a wide range of flows. They have a simple construction. They have easily fitted between the flanges. | 1 No |
| 11 | Pitot Tube | 10 inch It is easy and economical to install and remove. It has no moving parts which helps in minimizing frictional losses. It is small in size. It is low in cost. It causes very less pressure loss. | 1 No |
| 12 | U Tube Double Column Manometer of different sizes | 15 cm, 25 cm, 50 cm, 100 cm U tube manometer has a simple construction. It is inexpensive in cost and working. | 1 No |

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| | | Accurate readings. Pressure readings can be easily calculated. | |
| 13 | Differential Manometer and Inclined Tube Manometer | 50 cm Scale It can be used as a water level indicator in a boiler as a boiler mounting. A differential manometer is used in the laboratory, for calculating flow rates and velocities of different fluids. It is also used in industries to measure differential pressures of low-velocity fluids. | 1 No |
| 14 | Inclined Manometer | 20-0-20 cm Inclined manometers provide greater readability by stretching a vertical differential along an inclined indicating column, giving more graduations per unit of vertical height and increasing the instrument sensitivity and accuracy. Inclined manometers frequently have scales graduated to hundredths of an inch. | 1 No |
| 15 | Demonstration Manometer | 50 cm It has better sensitivity. It has good accuracy. It has simple operation and construction. It does not have to be calibrated against any standard, the pressure difference can be calculated from the first principles. | 1 No |
| 16 | Piezometer Tube | One Meter Long Simple and reliable. Used to measure static pressure fluid in a container. One of the main application of piezometer is that it is used to measure pore water pressure/ ground water level. They are helpful in calculations to find performance of soil and rock. | 1 No |
| 17 | Differential Manometer | One Meter Long A differential manometer is a device that measures the difference in pressure between two places. Differential manometers can range from devices simple enough to be built at home to complex digital equipment. | 1 No |
| 18 | Hydraulic Non-return valve | 5000 psi They reduce down time and loss of production due to the failure of unsuitable valves. They increase energy savings, thanks to low pressure drop, and are very effective in preventing water hammer. | 1 No |
| 19 | Hydraulic Gate valve | Flexible Wedge, Solid Wedge Gate Valves Have Low Fluid Resistance. Gate Valves Provide Superior Sealing Performance. Gate Valves Have a Wide Application Range. Gate Valves are Bidirectional. | 1 No |
| 20 | Hydraulic Globe Valve | Z-type, Y-type and angle type The ball valve installation is easy and quick. Their valve seats are easily accessible if the valve needs repair. At very low torques on the arm, they offer bubble tight flow sealing. | 1 No |
| 21 | Centrifugal Runner Actual Cast Iron | Diameter: 1 - 120 in. Length: Up to 50 ft. Weight: Up to 5 tons Greater strength. The greater strength of parts produced using centrifugal casting is a result of higher density grain structures. Increased product purity. Better production cost-efficiency. | 1 No |
| 22 | Different Impellers of Pumps | Open impeller, Semi-open impeller, Closed impeller Commonly used for loading/offloading applications. Lightweight and compact design. Versatile port configuration. Ability to handle a wide variety of fluids. | 1 No |
| 23 | Display Board for Pipes | 1.2 x 1.0 meter it helps in visual learning | 1 No |
| 24 | Hydraulic Jack | 10 Ton It occupies less space, They are also less likely to Jam due to rust in the | 1 No |

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|----|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| | | <p>screw thread. It is highly effective with heavy loads. It lifts load with minimum effort. It is easier to use. It is bit lighter than screw jack. Load Capacity : 10 T Weight : 16 kg Dimension LxWxH : 57x30x24 cm</p> | |
| 25 | Hydraulic Press Model | <p>300 Ton Cost-Cutting. They have a significant cost advantage over mechanical presses; if they experience breakdowns, replacement parts are inexpensive and the work is simple. ... Built-In Overload Protection Dimension (L*W*H):182X75X225cm. Pressure:30 Mpa</p> | 1 No |
| 26 | Hydraulic Ram | <p>works on a principle called 'water hammer' Uses renewable energy sources. If properly designed, can be produced and maintained locally. Very effective in mountaneous areas Hydraulic Cylinder, Dimension/Size: 40mm To 350mm Bore And 25mm To 180 Mm Rod. Max. Stroke (mm): 3000 Structure Type: Welded,mill type,tie rod Mounting Style: Clovis,flagged,trunion mounting Capacity (Ton): 200 ton</p> | 1 No |
| 27 | Gear Pump Model | <p>3000 LPM Easy to use and maintain. The gear pump is compact and consists of only two gears, the pump body and the front and rear covers. Low cost. High work efficiency. Insensitive to fluid viscosity and density.</p> | 1 No |
| 28 | Rotary Pump | <p>Gear Pump, Screw Pump Low risk of media entrapment and compaction. Change of rotation. High efficiency with low life cycle costs at the same time. Easy maintenance and compact design. Gentle, low-pulsation and constant conveying with high dosing precision.</p> | 1 No |
| 29 | Centrifugal Pump (Actual Cut Section) | <p>radial flow, mixed flow, or axial flow Corrosion Resistance. Finish Thompson's centrifugal chemical pumps are manufactured using corrosion-resistant materials. Energy Efficiency. Smooth Flow. Proven Reliability</p> | 1 No |
| 30 | Reciprocating Pump | <p>0.3-10000 LPH Reciprocating pump can deliver the required flow rate very precisely. It gives a continuous rate of discharge. It can deliver fluid at very high pressure. No priming is needed in the reciprocating pump.</p> | 1 No |
| 31 | Submersible Pump | <p>0.37 kW – 3.7 kW (0.5HP-5 HP) Priming: They don't have to be primed. ... Cavitation: Because they are fully submerged, submersible pumps are not prone to cavitation. ... Efficiency: When a pump is submerged there is positive fluid pressure at the inlet of the pump. Pipe Size (Millimeter) 120 mm Pump Stage 10/4 Power 0.75 kw</p> | 1 No |

Lot 4: Hydraulics & Fluid Mechanics Lab Equipment (Closed Circuit) – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
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| 1 | Centrifugal Pump Test Rig | <ol style="list-style-type: none"> 1. Clear Water Flow- Medium 2. Spring Balance- Dial type 3. Speed- 2800 RPM 4. Sump Tank Capacity- 110 Liters 5. Stop watch- Electronic 6. Bourdon type- Pressure Gauge 7. RPM Measurement-Digital RPM Indicator with Proximity sensor 8. Capacity- 1 HP 9. Flow Measurement-Using Measuring Tank with Piezometer | 1 No |
| 2 | Reciprocating Pump Test Rig | <ol style="list-style-type: none"> 1. Pump: Double acting, Single Cylinder 2. Capacity 1 HP 3. Speed 250 RPM (max.) and Head 5kg/cm²(max.) 4. Medium Flow: Clear Water 5. Spring Balance: Dial type 6. Sump Tank: Capacity 65 Ltrs 7. Flow Measurement: Using Measuring Tank & Cap. :40 Ltrs with Electronic Stop Watch 8. Pressure Gauge: Bourdon type. | 1 No |
| 3 | Gear Pump Test Rig | <ol style="list-style-type: none"> 1. Sump Tank Capacity-35 Liters 2. Bourdon Type- Vacuum Gauge, Pressure Gauge 3. RPM measurement- Digital RPM Indicator with Proximity sensor 4. Energy measurement- Electronic Energy meter 5. Flow Measurement- Using Measuring Tank (Capacity 20 Ltrs. (approx.)) and Electronic Stop Watch 6. Oil SAE 20W 40 (30 litres) 7. Pump Speed- 1500 RPM 8. Pressure 5kg/cm²(max.) | 1 No |
| 4 | Hydraulic Ram Test Rig | <ol style="list-style-type: none"> 1. RAM: Size 50x 15mm, Supply Head 2.5m, Delivery Head 10 m (max.) 2. Air Vessel: Suitable Capacity 3. Delivery Line: For RAM, Dia 50 mm length 6 m 4. Pump: Capacity 1 HP 5. Supply Tank: Capacity 150 Ltrs 6. Overhead Tank: Capacity 100 Ltrs 7. Measuring Tank: Suitable Capacity one each for useful and waste (2 Nos.) with Piezometer Tube & Scale 8. Piping: GI/PVC 9. Stop Watch: Electronic 10. Pressure Gauge: Bourdon Type 11. Stainless Steel Tanks | 1 No |
| 5 | Two Stage Air Compressor Test Rig | <ol style="list-style-type: none"> 1. Air compressor – Double cylinder, two-stage type driven by a 2-hp. motor 2. Air tank and orifice with water manometer for air intake measurement 3. Pressure gauges at outlet on both stages 4. Digital temperature indicator 5. Energy meter to measure input power Horse Power 5 HP | 1 No |

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| | | Voltage 415 Air Receivers 220 Ltr Cylinder Size 100 mm x 63 mm Weight Approx 250 kg | |
| 6 | Centrifugal Compressor Test Rig | <ol style="list-style-type: none"> 1. Compressor: Centrifugal compressor, with forward curved impeller 2. Motor: Variable Speed Motor, Power 0.5 hp, 2800 RPM with speed controller 3. Pitot Tube & Manometer: Pitot tube with U Tube water manometer for Air flow measurement 4. Piezometer: Range 0-150mm of Water Column, for delivery pressure 5. Inclined Tube Manometer: Range 0-100 mm of Water Column, for intake pressure 6. RMP Indicator with Inductive Speed Sensor: Range – 0 to 9999 7. Temperature Sensor & Indicator: RTD PT-100 Sensors (2 Nos.) With Indicator 8. Voltmeter: Digital Voltmeter, 0 – 500 V 9. Ammeter: Digital Ammeter, 0 – 2 A | 1 No |
| 7 | Rotary Compressor Test Rig | <ol style="list-style-type: none"> 1. Vane compressor – Rotary compressor, driven by 3 HP motor 2. Calibrated orifice meter with water manometer to measure air intake 3. Energy meter to measure input of the meter 4. Pressure gauge to measure discharge pressure 5. Control valve at delivery side 6. Stop clock | 1 No |
| 8 | Axial Flow Fan Demonstration Unit fitted with sensors and Instruments to carry out various experiments | <p>215 +/- 5 V</p> <p>Efficient Airflow: Industrial axial flow fans assure efficient airflow, which is why they are cooling towers and exhausts.</p> <p>Variable Speed</p> <p>Durable Construction</p> <p>Quick Maintenance</p> <p>(Manufactured by Armfield Ltd. /USA)</p> | 1 No |
| 9 | Centrifugal Pump Demonstration Unit fitted with sensors and Instruments to carry out various experiments | <p>radial flow, mixed flow, or axial flow</p> <p>Corrosion Resistance. Finish Thompson's centrifugal chemical pumps are manufactured using corrosion-resistant materials.</p> <p>Energy Efficiency.</p> <p>Smooth Flow.</p> <p>Proven Reliability</p> <p>(Manufactured by Armfield Ltd. /USA)</p> | 1 No |
| 10 | Basic Hydraulic Bench with Accessories to carry-out the following experiments. | <p>Dead weight calibrator Hydrostatic pressure Bernoulli's Theorem demonstration Orifice discharge Energy losses in pipes Flow meter demonstration Energy losses in bends Hydraulic Ram Series / Parallel Pumps Cavitation demonstration</p> <p>Pressure Control.</p> <p>Lifting and Pressing Ability.</p> <p>Adaptability.</p> <p>Simple Design.</p> <p>Consistent Pressure Tonnage.</p> | 1 No |

Lot 5: Demonstration Unit with Experimental Setup (Electrical)– 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1 | Machine suitable for separately excited, series, shunt and Compound Connections and excitation. | <p>2.5 kW, 220V, 1500 r.p.m Conforming to the standard IS/IEC 60034-1:2004 All copper winding class F insulation. Duty Cycle :S1 Forge Air Cool, Minimum 20% compensation in series winding at full load current. Maximum 10% speed regulation. 60 Seconds withstand of 1.5 times rated current by commutator at Full Load Speed. Efficiency > 90% at full load</p> <p>Accessories 4 point starter, Fuse, 2 Pole MCB, Requisite DC Digital volt , amp meters, RPM Meters from proximity sensor mounted on shaft and mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 meter on a 5 mm MS angle frame with 1 meter ground clearance and twin core armored cable of 5 meter</p> | 1 No |
| 2 | 3-point, 4 point starter & series motor starter suitable for | <p>3 Point Starter for 2 to 4 KW, 220 V, 1500 r.p.m machine with NVC design for field winding 250 ohms to 500 ohms and OLR with adjustable range from 100 to 150 percent load</p> <p>4 Point Starter for 2 to 4 KW, 220 V, 1500 r.p.m machine for field winding 200 ohms to 350 ohms and OLR with adjustable range from 100 to 150 percent load</p> | 1 No each |
| 3 | Shunt motor. | <p>3kW, 220V, 1500 r.p.m Conforming to the standard IS/IEC 60034-1:2004 All copper winding class F insulation. Duty Cycle :S1 Forge Air Cool, Maximum 20% speed regulation. 60 Seconds withstand of 1.5 times rated current by commutator at Full Load Speed. Efficiency > 90% at full load. Excitation resistant not less than 350 ohms.</p> <p>Accessories 4 point starter, Fuse, 2 Pole MCB, Requisite DC volt , amp, meters mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 meter on a 5 mm MS angle frame with 1 meter ground clearance and twin core armored cable of 5 meter</p> | 1 No |
| 4 | 3-Phase Squirrel cage induction motor. | <p>5kW, 400V, 50Hz, 1440 r.p.m Premium Class efficiency class IE4 Conforming to standard IS-12615 (2018) with BIS certification Foot mounted with protection IP44 or superior HV Test, Full Load Test, Over Speed Test, Winding Resistance conforming to IS-15999 (Part -I) S1 Duty Cycle: Insulation -F Class All copper winding</p> <p>Accessories Requisite DOL Starter with 4 Pole MCB and Fuses, Requisite AC, Digital volt , amp, frequency, phase sequence meters, RPM Meters from proximity sensor mounted on shaft and mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 meter on a 5 mm MS angle frame with 1 meter ground clearance and four core armored cable of current capacity 150% full load and length 5 meter Requisite earthing to be done during installation</p> | 1 No |

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| 5 | single phase transformer. | 5KVA, 220V/440V, 50Hz. With tapings at 25%, 50% and 75% at primary and secondary. Conforming to ANSI C57.12.21 Insulation -F Class with protection IP44 or superior Inner & Outer Coil: Copper, Coil Conductivity : 5.7e+007 Thermal Conductivity -401, Safety: Class 1 Core-Laminated Steel (M36) Mass Density: 7700 Kg/mtr cube, Electrical Conductivity: 2.32558e+006 Thermal Conductivity: 43, Air Cooled, Shell Type: Efficiency: 97% | 1 No |
| 6 | single phase auto transformer. | 5 Amp, 50Hz, 0-240 V, All copper Torroid Winding with smooth/fine voltage variation. Class F insulation | 1 No |
| 7 | single phase auto transformer. | 16 Amp, 50Hz, 0-240 V, All copper Torroid Winding with smooth/fine voltage variation..Class F insulation | 1 No |
| 8 | 3 phase auto transformer. | 30 Amp, 20 kva, 0-440V, 50Hz, 3 phase All copper 3 Torroid Winding with smooth/fine voltage variation. Protection: IP44, Standard: IEC/UNE-EN 61558-1, Class F insulation | 1 No |
| 9 | DOL starter (ii) Star -Delta starter | D.O.L Starters for 3kW, 440V, 50Hz 3-phase 1440 r.p.m, I.M with overload settings 50% to 400%, under voltage tripping below 350 V. Star -Delta starter for 10kW, 440 V, 3 phase, 50 Hz, 1440 r.p.m. I.M with overload settings 50% to 400%, under voltage tripping below 350 V | 1 No each |
| 10 | (iii) Auto transformer starter Suitable for Squirrel Cage induction motor. | Auto transformer starter with oil immersed 3 phase core type all copper winding transformer for starting 40 HP, 440 V, I.M with tapings @ 40%, 80% and 100% Protection: IP44, Class F insulation | 1 No |
| 11 | 3-phase slipring induction motor with rotor starter | 5kW, 440V, 50Hz 1440 r.p.m Conforming to IS-325:1996, IPSS: 1-03-016-03, mounting IMB3 of IS- 2253:1974, All bearing IS 3284:1983 with L10 life Pullout Torque-275% of rated torque Over Speed upto 2000 rpm for minimum 2 minutes at Full Load, Rotor Voltage: 198V, Protection against no volt starting and over current with smooth speed control facility using knob. Conforming to IS 3914-1967 Accessories: Rotor Starter with protection against no volt starting and overload with 4 Pole MCB, Contactors and Fuses, Requisite AC, Digital volt , amp, frequency, phase sequence meters, RPM Meter from proximity sensor mounted on shaft. All meters and starters inside MS 18 guage cabinet mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 meter on a 5 mm MS angle frame with 1 meter ground clearance and four core armored cable of current capacity 150% full load and length 5 meter | 1 No |
| 12 | 3-phase alternator with DC compound motor | 7KVA, 3 Phase. 440V, 50Hz, 0.8 power factor (lag), 1500 r.p.m, Excitation Voltage: 110-220 V DC, Efficiency> 90%, knee point voltage 440 V AC per phase, coupled with 7kw, 220 V, 1500 rpm DC compound motor with all copper winding and 20% field compensation, with Class F insulation, Accessories: 4 Point Starter, 4 Pole MCB, Fuse, Requisite AC,DC volt , amp, frequency, phase sequence meters mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 | 1 Set |

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| | | meter on a 5 mm MS angle frame with 1 meter ground clearance and four core armored cable of current capacity 200% full load and length 5 meter Accessories: AC & DC Digital Volt Meters and Ammeters, Digital Frequency Meter, Digital RPM Meter from proximity sensor mounted close to shaft. Accuracy class 1. 5 Meter armored cable 4 core cable of 200% full load current carrying capacity. 2X5 Meter twin core armored DC cable having 150% full load current carrying capacity. | |
| 13 | shunt motor with starter. | 5kW, 250V, 1500 r.p.m shunt motor with all copper winding and accessories like Digital DC Volt Meter and Ammeter, RPM Meter with proximity sensor mounted on shaft. 4 Point Starter, all accessories mounted on ebonite 0.7 meter X 1 meter ebonite plate of thickness 5 mm mounted on MS angle frame with 1 meter ground clearance, DC twin core armored cable of 5 meter X 2 nos | 1 No |
| 14 | 3 Phase AC to DC Rectifier | 50 Amp 220V DC output with MCB and Fuses, 3 Phase 400 V AC input with 6 power diodes with heat sink and filter electrolytic capacitor of 300 micro farad at output and 4 Pole MCB and Fuses at input. Armored 4 core 40A AC Cable of 5-meter length and Twin Core armored 60A DC cable of 5-meter length to the panel board. | 1 No |
| 15 | Oil cooled 3 - phase transformer. | 20 KVA, ▲ or ▲ 11, % impedance: 5%, Oil immersed core type transformer with all terminals taken out | 1 No |
| 16 | Circuit breaker. | To calculate the breaker size, simply divide the adjusted wattage by 240 volts to find the rated amperage needed for your subpanel. Circuit-breakers respond quicker than fuses. Circuit-breakers are more reliable. Circuit-breakers are more sensitive. Unlike fuses which only operate once and need to be replaced a circuit-breaker can be reset. | 1 Set |
| 16 (i) | i. Air circuit breaker (ACB). | 3 Pole, 2500 Amps, 690V/1000V drawout type ACB with breaking capacity 50 KA 6E make: Entelliguard or equivalent Type Test report as per IEC 61439-Part 1 & 2 and IS/IEC 60947-2:2003 Report on internal avc test as per IEC 61641 Rated short time 1s withstand current 50 kva Rated making current -105 KA Rated Service Voltage – 690V Rated insulation voltage – 1000V One minute dry withstand test -2500V Rated Impulse withstand voltage – 8KV <u>Operating Time</u> Closing Time (Max)- 80 ms Breaking Time (Max) – 70 ms Operating Temp- 5 to 70 degree C Type of Tripping Mechanism- Direct/Shunt trip Manual Mechanism Method of closing –Electrically operated spring charged mechanical (Emergency) | 1 No |

| | | <p>Nominal voltage of tripping coil: 110V DC +/- 10% - 20%</p> <p>Voltage for spring charging motor- 230V AC +/- 10% - 20%</p> <p><u>Switch Gear Cubicles</u></p> <p>Design Voltage – 690V/1000V</p> <p>Minimum Clearances – Between phases 28 mm Between Line post and earth-20mm</p> <p>Type of enclose-IP54</p> <p>Power Frequency withstand voltage for complete cubicle-2.5 KV</p> <p>Space Heater- 230V, 105W (min)</p> <p>Type and Material of inter phase barriers – FRP/SMC/Poly Carbonate</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 16(ii) | ii. Oil circuit breaker (OCB). | <p>SCOPE: This specification covers the design, manufacture, assembly inspection and testing before disptach/installation packing & delivery F.O.R. designation of ICCB of thermal magnetic type with Auxiliary switch with all other accessories & supporting structure required for satisfactory operation.</p> <p>STANDARDS: The oil circuit breaker should conform to the latest edition and amendment available at the time of supply of material. ISS-13947-2 => Accuracy of Moulded Case Circuit Breaker. IEC-947 =>Specification for protection/Safety of ICCB</p> <p>Equipment meeting with the requirement of other authoritative standards whichever equal or better quality than the standards mentioned above, shall also be acceptable, the equipment offered by the bidder, conform to other standards, salient points of reference between the standards adopted and the specified standards shall be clearly brought out in the offer. Four copies of reference standards in English language shall be furnished alongwith the offer.</p> <p><u>CLIMATIC CONDITION:</u> The equipment are required to operate satisfactory under the following conditions: -</p> <p>i. Maximum temperature: 50° C</p> <p>ii Maximum temperature: - 2.5° C</p> <p>iii Relative humidity</p> <p>(a) Maximum 100%</p> <p>(b) Minimum 26%</p> <p>iv Isoceraunic level 45 v Number of rainy days per year Nearly 120 days</p> <p>vi Average rainfall per annum 900 mm</p> <p>vii Average number of dust storms days per annum. 35</p> <p>viii Altitude 1000 meters above means sea level</p> <p>ix Maximum temperature in the shade. 45° C</p> <p>x Maximum wind pressure. 195 Kg./Sq. meter</p> <p><u>PRINCIPAL PARAMETERS:</u></p> <table border="1"> <thead> <tr> <th>SL No</th> <th>Particulars</th> <th>Unit</th> <th>T/f Capacity (In KVA)- 25KVA</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Rated Current</td> <td>Amp</td> <td>33</td> </tr> <tr> <td>2</td> <td>Specification Standard</td> <td>IS/IEC</td> <td>IS/IEC-60947-2</td> </tr> <tr> <td>3</td> <td>Resistance at 300C</td> <td>m.Ohm</td> <td>1.70</td> </tr> <tr> <td>4</td> <td>Breaker Losses</td> <td>watt</td> <td>6</td> </tr> <tr> <td>5</td> <td>Rated operational voltage</td> <td>Volt</td> <td>460</td> </tr> </tbody> </table> | SL No | Particulars | Unit | T/f Capacity (In KVA)- 25KVA | 1. | Rated Current | Amp | 33 | 2 | Specification Standard | IS/IEC | IS/IEC-60947-2 | 3 | Resistance at 300C | m.Ohm | 1.70 | 4 | Breaker Losses | watt | 6 | 5 | Rated operational voltage | Volt | 460 | 1 No |
| SL No | Particulars | Unit | T/f Capacity (In KVA)- 25KVA | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. | Rated Current | Amp | 33 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Specification Standard | IS/IEC | IS/IEC-60947-2 | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Resistance at 300C | m.Ohm | 1.70 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Breaker Losses | watt | 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Rated operational voltage | Volt | 460 | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | <table border="1"> <tr><td>6</td><td>Rated insulation voltage</td><td>Volt</td><td>700</td></tr> <tr><td>7</td><td>Short Circuit endurance</td><td>KA</td><td>4KA</td></tr> <tr><td>8</td><td>Operational endurance (min 10000)</td><td>Nos.</td><td>>10000</td></tr> <tr><td>9</td><td>Dielectric Strength</td><td>KV</td><td>15</td></tr> <tr><td>10</td><td>Over Load Tripping</td><td></td><td>Yes</td></tr> <tr><td>11</td><td>Short Circuit Tripping</td><td></td><td>Yes</td></tr> <tr><td>12</td><td>Thermal Tripping</td><td></td><td>Yes</td></tr> <tr><td>13</td><td>Magnetic Tripping</td><td></td><td>Yes</td></tr> <tr><td>14</td><td>Tripping Temperature</td><td></td><td>Bi-metallic</td></tr> <tr><td>15</td><td>Contacts</td><td>°C</td><td>85 °C to 110 °C</td></tr> <tr><td>16</td><td>Short Circuit Tripping time</td><td></td><td>Copper Tungsten</td></tr> <tr><td>17</td><td>Magnetic tripping time</td><td>ms</td><td>20 Milliseconds</td></tr> <tr><td>18</td><td>Load Management Signal</td><td>ms</td><td>---</td></tr> </table> | 6 | Rated insulation voltage | Volt | 700 | 7 | Short Circuit endurance | KA | 4KA | 8 | Operational endurance (min 10000) | Nos. | >10000 | 9 | Dielectric Strength | KV | 15 | 10 | Over Load Tripping | | Yes | 11 | Short Circuit Tripping | | Yes | 12 | Thermal Tripping | | Yes | 13 | Magnetic Tripping | | Yes | 14 | Tripping Temperature | | Bi-metallic | 15 | Contacts | °C | 85 °C to 110 °C | 16 | Short Circuit Tripping time | | Copper Tungsten | 17 | Magnetic tripping time | ms | 20 Milliseconds | 18 | Load Management Signal | ms | --- | |
| 6 | Rated insulation voltage | Volt | 700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Short Circuit endurance | KA | 4KA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Operational endurance (min 10000) | Nos. | >10000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Dielectric Strength | KV | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Over Load Tripping | | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Short Circuit Tripping | | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Thermal Tripping | | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Magnetic Tripping | | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Tripping Temperature | | Bi-metallic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | Contacts | °C | 85 °C to 110 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Short Circuit Tripping time | | Copper Tungsten | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Magnetic tripping time | ms | 20 Milliseconds | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | Load Management Signal | ms | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16(iii) | iii. Minimum oil circuit breaker (MOCB). | <p>132 KV, MOCB Breaker</p> <p>A) Technical Specifications</p> <p>1) Type: Minimum oil type 2) Frequency: 50 HZ</p> <p>3) Nominal system voltage: 132 KV, Outdoor</p> <p>4) Poles: 3, Gang Operated</p> <p>5) Insulation level a) Highest system voltage: 145 KV b) Impulse withstand voltage 1.2/50 µs full wave : 650 KV</p> <p>c) 1 Min. power freq. wet withstand voltage : 275 KV</p> <p>6) Normal cont. current rating: 1250 A</p> <p>7) Rated breaking capacity: 19.3 KA equiv. to 4400 MVA at 132 KV Symmetrical at rated Voltage</p> <p><u>8) Rated re-striking voltage</u></p> <p>a) Amplitude factor: 1.6 b) Rate of rise of re-striking voltage: Natural freq. 3700/peak volt 230 KV</p> <p>9) Rated making capacity: 49.1 KA</p> <p>10) Rated short time current: 1 sec- 40 KA, 5 sec- 20 KA</p> <p>11) Operating duty: O-3'-CO-3'-CO</p> <p>12) Operating time from instant of trip coil energisation at rated breaking current: 0.085 sec</p> <p>13) Make time at rated making current: 0.127 sec.</p> <p>14) Weight of complete CB without oil: 3740 KG</p> <p>15) Qty of oil in complete CB: 930 lits.</p> <p>16) Rating of shunt trip coil: 110V DC</p> <p>17) Min. clearance of live part to earth in air : 1470 mm</p> <p>18) Insulation level of insulators a) Wet & dry power frequency voltage : 275 KV b) Impulse withstand voltage 1.2/50 µs full wave : 650 KV</p> <p>19) Rating of closing coil : 110V DC</p> <p>B) Creepage = 31 mm/KV</p> <p>C) a) Control voltage for closing / tripping of existing breaker : 110 V DC b) Control voltage for indication/ alarm : 110 V DC c) Aux supply voltage for panel lighting & Heaters : 1- Ph, 230V AC</p> | 1 No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16(iv) | iv. Sf6 circuit breaker. | Please refer Annexure 14 | 1 No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16(v) | v. Vacuum circuit breaker (VCB). | 12 kv VCB, 3 Pole Removable Cartridge Type with adjusting facility. Rated Current: 1250A, Rated Breaking Current: 25 KA. Rated Short Time (3s) Withstand Current 25 KA. Rated Short Circuit Rated Current 63 KA (50 Hz), Rated short time | 1 No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | withstand current (3s) 25 KA. Rated Short Circuit making current-63 KA (50 Hz). Rated Short Time power frequency withstands voltage- 28 KV. Rated lightning impulse-75 KV. Installation Drawout Type with cradle VCB mass 94 kg and Cradle 67 kg, conforming to IEC 62271-100 (2012) Accessories: Interlocking facility, spring charging mechanism using 0.5 hp 220 V DC/AC motor and tripping coil from 12 V DC. Manual spring charging facility. | |
| 17 | Isolator, Earthing switch & Lightning arrester | 220 kv, Double Break Isolator mounted on post insulator with interlocking facility and operated by 0.5 hp 220V DC motor from remote, Single Break motorize earthing switch with copper strip of 5 meter with earthing to be done at site. 12 KV metal oxide lighting arrestor Station Class Type conforming to IS-3070 P-III Nominal System Voltage 11 KV Fault Level 18.4 KA Maximum System BIL – 75 KVp Nominal Discharge Current- 10 KAp Maximum Lightning Impulse -8/20 micro second wave, 10 KA – 40 Maximum Switching Surge -500 A | 1 No each |
| 18 | Various Types of Fuses. | DC Fuses 20A AC Fuses 10A/20A Cartridge Fuses 50A, 100A, 200A D – Type Cartridge Fuse. HRC (High Rupturing Capacity) Fuse or Link Type Cartridge Fuse. High Voltage Fuses. Automotive, Blade Type & Bolted Type Fuses. SMD Fuses (Surface Mount Fuse), Chip , Radial, and Lead Fuses. Fuse is cheapest type of protection in an electrical circuit. Fuse needs zero maintenance. Operation of fuse is simple and no complexity is involved. Fuse has the ability to interrupt enormous short circuit current without producing noise, flame, gas or smoke. | 1 No each |
| 19 | Various Types of Armoured & Flexible power cable | 12 kV 4 core armored 250A XLPE Cable and length 5 meters with lugs. | 1 No |
| 20 | Overhead Line Insulators. | 33 kV PIN Insulator, STRAIN Insulators with mounting frames | 1 No |
| 21 | Flame Proof Enclosures of Mining Type Circuit Breaker & Electrical Motor. | Indian Standards IS : 2148 Circuit-breakers respond quicker than fuses. Circuit-breakers are more reliable. Electric motors are highly efficient devices mainly depending on their operation conditions and the size of the motor. | 1 No |
| 22 | D.C Machine for study of Armature winding & magnetic poles. | 5kW, 250V, 1500 r.p.m shunt motor with all copper winding and accessories like Digital DC Volt Meter and Ammeter, RPM Meter with proximity sensor mounted on shaft. 4 Point Starter, all accessories mounted on ebonite 0.7 meter X 1 meter ebonite plate of thickness 5 mm mounted on MS angle frame with 1 meter ground clearance, DC twin core armored cable of | 1 No |

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| | | 5 meter X 2 nos | |
| 23 | 3-Phase Squirrel cage induction motor. | 5kW, 400V, 50Hz, 1440 r.p.m Premium Class efficiency class IE4 Conforming to standard IS-12615 (2018) with BIS certification Foot mounted with protection IP44 or superior HV Test, Full Load Test, Over Speed Test, Winding Resistance conforming to IS-15999 (Part -I) S1 Duty Cycle: Insulation -F Class All copper winding Accessories Requisite DOL Starter with 4 Pole MCB and Fuses, Requisite AC, Digital volt , amp, frequency, phase sequence meters, RPM Meters from proximity sensor mounted on shaft and mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 meter on a 5 mm MS angle frame with 1 meter ground clearance and four core armored cable of current capacity 150% full load and length 5 meter Requisite earthing to be done during installation | 1 No |
| 24 | 3-Phase Slip-ring Induction Motor. | 5kW, 440V, 50Hz 1440 r.p.m Conforming to IS-325:1996, IPSS: 1-03-016-03, mounting IMB3 of IS- 2253:1974, All bearing IS 3284:1983 with L10 life Pullout Torque-275% of rated torque Over Speed upto 2000 rpm for minimum 2 minutes at Full Load, Rotor Voltage: 198V, Protection against no volt starting and over current with smooth speed control facility using knob. Conforming to IS 3914-1967 Accessories: Rotor Starter with protection against no volt starting and overload with 4 Pole MCB, Contactors and Fuses, Requisite AC, Digital volt , amp, frequency, phase sequence meters, RPM Meter from proximity sensor mounted on shaft. All meters and starters inside MS 18 guage cabinet mounted on ebonite plate of 4 mm thickness with size 0.7 meter X 1 meter on a 5 mm MS angle frame with 1 meter ground clearance and four core armored cable of current capacity 150% full load and length 5 meter | 1 No |
| 25 | 3-Phase Synchronous Motor. | 415V, 3 Phase, 5 HP, 20 Pole, 300 rpm, 50 Hz synchronous motor with induction starting, DC excitation from 220V DC, Current: 0.5 to 1 Amp, Starting/running torque 2.5 Nm · Starting/running torque 8 Nm. DOL Starter for starting. Accessories AC DC Digital volt meter and ammeter, phase sequence meter, frequency meter, RPM meter from proximity sensor mounter on shaft with 4 core armored cable 5 meter with 200% full load current capacity. 4 Pole MCB fuses. All accessories mounted on 5 mm ebonite plate of 0.7 Meter X 1 Meter fixed on MS angle with ground clearance of 1 Meter | 1 No |
| 26 | 3 Phase AC to DC Rectifier | 50 Amp 220V DC output with MCB and Fuses, 3 Phase 400 V AC input with 6 power diodes with heat sink and filter electrolytic capacitor of 300 micro farad at output and 4 Pole MCB and Fuses at input. Armored 4 core 40A AC Cable of 5-meter length and Twin Core armored 60A DC cable of 5-meter length to the panel board. | 1 No |
| 27 | LT AC | Cabinet made out of 18 gauze galvanized MS sheet with | 1 No |

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| | Distribution Panel | <p>powder coated paint. Incomer 1 & 2 – 4 Pole, 3 Phase, 440V, 250A, 25KA, MCCB Class-A, 300mA (RCCB) with HRC fuses conforming with IEC 60947-2 with interlocking facility between Incomer 1 & 2. LTCT on each phases of both the breakers. Incomer 1- Mains from Transformer Incomer 2- DG Set Bus Bar – Preassembled panel Copper Bus Bars as per relevant IS with cooling Fans Outgoing Feeder – 3 Phase 1 No – 63A, 12 KA, MCCB, 4P with HRC fuse for rectifier. – 3 Phase 4 Nos – 32A, 3P, 15 KA, MCB with fuses – 3 Phase 4 Nos – 32A, 4P, MCB with fuses. – 1 Phase 6 Nos (2No/Phase) – 6A, 2P, MCB with fuses – 1 Phase 3 Nos (1No/Phase) – 16A, 2P, MCB with fuses</p> <p>Digital Ammeter and voltmeter at each incoming & outgoing feeder with selector switch. Armoured cables of 150% FL current of 5 meters for each outgoing cable.</p> | |
| 28 | LT DC Distribution Panel | <p>Cabinet made out of 18 gauze galvanized MS sheet with powder coated paint. Incomer 1 – From rectifier with 2P, 50A, MCB with fuses Bus Bar – Copper Bus Bars as per relevant IS with cooling fan</p> <p>Outgoing Feeder –1 No – 32A, 2P MCB, with fuses. –4 Nos – 16A, 2P MCB, with fuses –4 Nos – 10A, 2P MCB, with fuses –2 Nos – 6A, 2P MCB, with fuses</p> <p>Digital Ammeter and voltmeter at each incoming & outgoing feeder. Armoured cables of 150% FL current of 5 meters for each outgoing cable.</p> | |

Lot 6: Automobile Equipment – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|--------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1 | Fuel supply System of a 4-cylinder diesel engine | Internal combustion engines (IC engines) External combustion engines (EC engines) Reaction engines. Throttle response increases, providing the biker appropriate needed power at all rpms. Cold start problems are almost eliminated. Better engine life. It results in Enhanced engine efficiency. It also offers better fuel efficiency. | 1 No |
| 2 | Lubrication System of an Automobile | types of lubrication: boundary, mixed and full film Friction interferes with smooth motion. It also causes heat, increases surface wear and can lead to equipment failure. Proper lubrication creates a layer of film between moving parts to thwart friction, thereby promoting smoother operation and longer equipment life. | 1 No |
| 3 | Cooling System of an Automobile | For operation at temperatures below 0 °C (32 °F) The main advantage of a cooling system in an internal combustion engine is that it helps to keep the engine running at a consistent temperature. This allows the engine to run more efficiently and helps to prevent corrosion. It reduces the temperature of the engine and hence increases its life. | 1 No |
| 4 | Actual Cut Section Gear Box: | 4 Forward & 1 Reverse low weight, compact design, no backlash, high gear ratios, high torques, and coaxial input and output. | 1 No |
| 5 | Actual Cut Section Gear Model with clutch | Semi-Automatic For any given engine speed it is your choice of gear that determines the speed and power of your vehicle. The clutch is the means of connecting the gears to the engine and allowing the turning of the engine to turn the wheels of your vehicle. | 1 No |
| 6 | Actual Cut Section Automatic Gear Box | Gear Type, Helical ; Orientation, Horizontal This system gives great driving pleasure. The reduced effort of the driver and more features available to the driver to handle the car. Better for hilly areas. Greatly reduced the risk of stalling. Easier to use especially in heavy traffic. | 1 No |
| 7 | Actual Cut Section Gear Box Car | Constant Mesh Industrial gearboxes not only provide essential benefits when it comes to creating goods, they also aid in the maintenance of your systems. Using a gearbox to multiply torque, match inertia, and reduce speed helps to cut systems operations by allowing smaller motors and drives to be utilized. | 1 No |
| 8 | Actual Cut Section Gear Box Jeep | Synchronic Mesh While automatic transmissions can easily help you maintain a slow and steady pace while off-roading, manuals will give you more control overall. | 1 No |
| 9 | Differential Gear Assembly (Actual Cut section | gear ratio = rotations of a driver gear : rotations of a driven gear. For every rotation of the 45-tooth gear, the 15-tooth gear must rotate 3 times. Both driving wheels can rotate in the same direction at the same speed. | 1 No |

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| | | Both driving wheels can rotate in the same direction at different speeds. Both driving wheels can rotate in the opposite direction at the same speed. | |
| 10 | Rear Axial Assembly (Actual Cut section) | 230v A rear axle assembly is a very large and heavy piece of steel and iron that is used to propel the vehicle by converting rotational force into linear motion. The drive shaft sends rotational power from the engine and transmission to the rear axle assembly differential. | 1 No |
| 11 | Sectional Working Model of 2 Stroke petrol engine | 2 Stroke petrol engine Simple mechanism. Easy to start. It gives one power stroke per revolution of the crankshaft. It has no valves, so complicated valve actuating mechanism not required. It is light weight, 30% lighter than the 4-stroke engine. It has few moving parts, so compact and simple construction. | 1 No |
| 12 | Sectional Working Model of 4 Stroke petrol engine | 4 Stroke petrol engine Four stroke engines give higher efficiency. It creates less pollution. Less wear and tear due to good lubrication system. It is quieter in operation. It runs cleaner due to no extra oil added in fuel. They give high rpm at low power. | 1 No |
| 13 | Sectional Working Model of 2 Stroke diesel engine | 2 Stroke diesel engine Simple mechanism. Easy to start. It gives one power stroke per revolution of the crankshaft. It has no valves, so complicated valve actuating mechanism not required. It is light weight, 30% lighter than the 4-stroke engine. It has few moving parts, so compact and simple construction. | 1 No |
| 14 | Sectional Working Model of 4 Stroke diesel engine | 4 Stroke diesel engine More fuel efficiency :- 4 stroke engines have greater fuel efficiency than 2 stroke ones because fuel is consumed once every 4 strokes. Less pollution :- As power is generated once every 4 strokes & also as no oil or lubricant is added to the fuel; 4 stroke engine produces less pollution | 1 No |
| 15 | Actual Cut Section of Four stroke | Single cylinder Vertical Diesel Engine Four stroke engines give higher efficiency. It creates less pollution. Less wear and tear due to good lubrication system. It is quieter in operation. It runs cleaner due to no extra oil added in fuel. They give high rpm at low power. | 1 No |
| 16 | Four Stroke Four Cylinder | Actual Cut-section Engine Model Four stroke engines give higher efficiency. It creates less pollution. Less wear and tear due to good lubrication system. It is quieter in operation. It runs cleaner due to no extra oil added in fuel. They give high rpm at low power. | 1 No |
| 17 | Twin Cylinder Four stroke vertical diesel | 220V AC 50 Hz Simple mechanism. Easy to start. | 1 No |

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| | engine test rig | It gives one power stroke per revolution of the crankshaft. It has no valves, so complicated valve actuating mechanism not required. It is light weight, 30% lighter than the 4-stroke engine. It has few moving parts, so compact and simple construction. | |
| 18 | Nozzle Tester | Max Pressure : 40 MPa or 60 Mpa Volume of fuel Tank 1500ml Nozzle tester is a special equipment used to calibrate fuel injector. It can test opening pressure, sealing performance, and spray pattern of the fuel injector with a double-range pressure gauge and two unions. | 1 No |
| 19 | Cummins PT Pump Test Stand | Model No. PTW 100 Rapid and accurate & fast testing of cummins PT Injectors | 1 No |
| 20 | Fuel Injector Pump Tester for Heavy Duty Type for Multi Cylinder Engine | 10 H.P. or 15 H.P., 3 Phase, 415V, 50 Cycles Throttle response increases, providing the biker appropriate needed power at all rpms. Cold start problems are almost eliminated. Better engine life. It results in Enhanced engine efficiency. It also offers better fuel efficiency. More efficient burning of fuel results in cleaner environment. | 1 No |
| 21 | Cummins Tools and equipments | 6.7L Cummins has proven itself as one of the best in the game for pickups that pull or haul heavy loads | 1 No |
| 22 | Cummins PT Injector Test Stand | Model No. PTW200 Cost reduction by using an existing test bench; Best solution for those who are seeking testing of cummin PT pumps; Utilizes the available space. | 1 No |
| 23 | Injector Leakage tester | 6000psi | 1 No |
| 24 | Injector Top Stop Fixture | Compact structure | 1 No |
| 25 | STC Top Stand | STC with digital indicator | 1 No |
| 26 | Injector Disassembly & Assembly Tool | Tools to assemble & disassemble | 1 No |
| 27 | Injector Cup Spray Tester | 6000psi | 1 No |
| 28 | Common Rail System Injector Tester | 400 Volts / 50 Hz The common rail injector tester has the Short-circuit protection, ground protection, over pressure protection during the testing. Software advantage: Intelligent algorithm is used on this injector tester machine, to automatically calibrate the fuel quantity of the new injector, and generate test plan after calibration | 1 No |

Package B: Equipment for Stone Processing Machine Operator

Lot 1: General Machinery – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1 | Drilling Machine (Stone Drilling Machine) | <p>0 to 200mm Capacity Motorised with Chuck and key It is very compatible and handy for machining. It is accurate, economical, portable and least time consuming while machining. Heavy work pieces can be machined in any position without moving them. Hole Diameter : 100-200 mm Drilling Depth Upto 130feet (40 Meters) Drilling Diameter 4.5" (114mm) to 6" (152mm) Pull Up Force 4000kgf Drill Head torque 180 kg.m</p> | 1 No |
| 2 | Drill HSS | <p>6mm to 12mm in steps of 1mm Application temperature over 600°C. High strength (high breaking strength) Good grindability during production. Good regrindability of blunt tools. Relatively low price. Standard series HSS drill bits are stocked in diameters from 2.5mm to 13mm and lengths ranging from 57mm to 151mm, to accommodate a wide range of fixing sizes.</p> | 2 Nos |
| 3 | Drill Angle Gauge | <p>118° is the most common point angle. Suitable for drill bits up to a diameter of 50 mm Drill angle gauges, also known as drill point gauges and drill sharpening gauges, are used to gauge the angle of a bit to ensure it's been sharpened to the correct angle. 118° is the most common point angle. Suitable for drill bits up to a diameter of 50 mm</p> | 2 Nos |
| 4 | Drilling Machine Motorized pillar | <p>20mm Capacity Easy to set up and organise in terms of numbers and equipment. Easy to monitor. Base Size: 460 x 320 mm Drilling Capacity (Steel): 20mm</p> | 1 No |
| 5 | Steel Tape one Meter | <p>Steel Tape is made of steel ribbon varying in width from 6 mm to 16 mm. It is available in lengths of 1, 2, 10, 30 and 50 meters It is extremely durable and can measure up to 100 feet, depending on the tape measure. They are extremely compact, and can easily be carried from location to location.</p> | 1 No |
| 6 | Direct Reading vernier caliper | <p>200mm Measuring the distance between two opposite side of an object. It can be measured 0.01 mm to 1828 mm</p> | 1 No |
| 7 | Hydraulic Jack | <p>10 Ton It occupies less space, They are also less likely to Jam due to rust in the screw thread. It is highly effective with heavy loads. It lifts load with minimum effort. It is easier to use. It is bit lighter than screw jack.</p> | 1 No |

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| | | Load Capacity : 10 T Weight : 16 kg Dimension LxWxH : 57x30x24 cm | |
| 8 | Mobile Crane | 10 Ton Mobile Crane Crane use Smooth Descent Valve (SDV). Speed up your crane extension. Operation & Control Smooth loading Capacity : 10 T Boom Length : upto 10 meter Lifting Capacity : 11.4 T | 1 No |
| 9 | Front end loader | Bucket size 1.8-2.5 Cubic mtr Traction speed cycle time enhance loader work, keep the machine balance Transmission pipe Retain the load Bucket size : 1.8-2.6 Cubic mtr Gross Power : 25 HP Max Operating Weight : 5000 kg Max Dig Depth : 3000 mm | 1 No |
| 10 | Power Generator | 10kva Power Genarator is very easy and efficient to transmit over a long distance No need for matching a voltage Cost of ownership is lower They have a quiet operation Easier to maintain this generator Dimension: 1760 x 900 x 1225 mm. Engine Power: 24.8 HP (at 1500 rpm) | 1 No |
| 11 | Air Compressor | 30C 30L 2HP An air compressor can also function at high temperatures and in locations where explosions and fire hazards restrict other forms of energy. Air can be generated on site, so there's more control over usage and air quality. Also, air compressors can run tools and equipment that generate more power than normal tools. Tank capacity : 30L Dimension: 24.4 x 11 inch | 1 No |
| 12 | Gang saw Machine | Multiwire Create Faster and More Accurate Cuts Reduction in wastage Dimension 3.15 x 3 x 2 m Total load 115 H.P. | 1 No |
| 13 | Stripping Machine | 220 VAC, 50 Hz High speed and highly effective Bright surface and good roughness Stable machining process Competitive price Easy to control and maintenance Dimensions : 770 x 740 x 400 mm Weight : 120 kg Power Supply : AC 220 V/ 50/60/Hz Power Consumption : 700 W | 1 No |
| 14 | Calibrating Machine | Multimeter Maintains accuracy Standardization and repeatability in measurements Assuring | 1 No |

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| | | reliable benchmarks and results ISO 17025 standard covers the general requirements for the competence of testing and calibration laboratories | |
| 15 | Polishing Machine | Lion 7.5HP polish and Buf grinder 508 Greater durability. Better electrical conductivity. Corrosion resistance. Enhanced brightness, color and reflectivity. Improved chemical and electrical resistance. Variable Speed : 1100 to 1400 R.P.M Control by Dimmer 50 to 1400 R.P.M Control by Potentiometer | 1 No |
| 16 | Champhring Machine | 250W / 380V Chamfering is a process of breaking sharp edges, which helps in assembling or intersecting two metal parts together easily. It is done for safety and prevention of any damage through the sharp edges of any metal body. Speed 2800rpm Weight 28.8kg/32.8kg Power 380V 250W | 1 No |
| 17 | Artificial respirator | Drager pss 3000 self contained artificial respiration, breathing induced by some manipulative technique when natural respiration has ceased or is faltering. Such techniques, if applied quickly and properly, can prevent some deaths from drowning, choking, strangulation, suffocation, carbon monoxide poisoning, and electric shock. Capacity : 1000-4000 ml Dimensions mm (H x W x D) 590 x 290 x 160 | 5 Nos |
| 18 | Software package for stone design (latest version) educational version | CAD, Turbo CAD (TurboCAD is a CAD software application for 2D and 3D design and drafting which runs on MacOS and Microsoft Windows operating systems) | 1 No |

Package C: Equipment for Stone Mining Machine Operator

Lot 1: General Machinery – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1 | Drilling Machine | <p>0 to 200mm Capacity Motorised with Chuck and key It is very compatible and handy for machining. It is accurate, economical, portable and least time consuming while machining. Heavy work pieces can be machined in any position without moving them. Hole Diameter : 100-200 mm Drilling Depth Upto 130feet (40 Meters) Drilling Diameter 4.5" (114mm) to 6" (152mm) Pull Up Force 4000kgf Drill Head torque 180 kg.m</p> | 1 No |
| 2 | Drill HSS | <p>6mm to 12mm in steps of 1 mm Application temperature over 600°C. High strength (high breaking strength) Good grindability during production. Good regrindability of blunt tools. Relatively low price. Standard series HSS drill bits are stocked in diameters from 2.5mm to 13mm and lengths ranging from 57mm to 151mm, to accommodate a wide range of fixing sizes.</p> | 2 Nos |
| 3 | Drill Angle Gauge | <p>118° is the most common point angle. Suitable for drill bits up to a diameter of 50 mm Drill angle gauges, also known as drill point gauges and drill sharpening gauges, are used to gauge the angle of a bit to ensure it's been sharpened to the correct angle.</p> | 2 Nos |
| 4 | Drilling Machine Motorized pillar | <p>20mm Capacity Easy to set up and organise in terms of numbers and equipment. Easy to monitor. Base Size: 460 x 320 mm Drilling Capacity (Steel): 20mm</p> | 1 No |
| 5 | Steel Tape one Meter | <p>Steel Tape is made of steel ribbon varying in width from 6 mm to 16 mm. It is available in lengths of 1, 2, 10, 30 and 50 meters They are extremely durable and can measure up to 100 feet, depending on the tape measure. They are extremely compact, and can easily be carried from location to location. Steel Tape is made of steel ribbon varying in width from 6 mm to 16 mm. It is available in lengths of 1, 2, 10, 30 and 50 meters</p> | 1 No |
| 6 | Direct Reading vernier caliper | <p>200mm Measuring the distance between two opposite side of an object. It can be measured 0.01 mm to 1828 mm</p> | 1 No |
| 7 | Diamond Wire-Saw/ Chain Saw | <p>750W 3300 RPM High yield and low cost. The cutting direction is not limited. High cutting efficiency. Widely applicable. Environmental protection. The diameter of diamond wire saw and steel cable are 10-12</p> | 1 No |

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| | | mm and 5 mm respectively. Number of beads varies between 30 and 35 in one meter of the wire that makes intervals between 25 and 32 mm. | |
| 8 | Slot Drill | 3MM Slot drills have 2 flutes, and are used for cutting slots. And equally importantly, the cutting edges on the end of the mill extend clear to the center of the bit, allowing it to do a plunge cut. Shank Type Screwed Cut Length 9.5 mm, 12.5 mm, 16 mm, 18 mm, 21 mm, 24 mm Cutter Diameter 3 mm, 4 mm, 6 mm, 8 mm, 10 mm, 12 mm Number of Flutes 2 | 1 No |
| 9 | Jack Hammer | 1700W Jackhammers are used to demolish old concrete, remove pavement, and demolish many other surfaces in projects. The jackhammer itself is heavy, so, only appropriate personnel should handle the tools to reduce the risk of accidents. Power Consumption 1700W Weight 24.2KG Impact Rate 1400bmp Size/Dimension Dimensions 25 x 20 x 25 cm | 1 No |
| 10 | Hydraulic Jack | 10 Ton It occupies less space, They are also less likely to Jam due to rust in the screw thread. It is highly effective with heavy loads. It lifts load with minimum effort. It is easier to use. It is bit lighter than screw jack. Load Capacity : 10 T Weight : 16 kg Dimension LxWxH : 57x30x24 cm | 1 No |
| 11 | Air Bag / Pillow | 2ft/8ft Comfort Reduced noise and vibration Versatility on load Dimension: 90 x 180cm | 1 No |
| 12 | Water Bag | 10 Ltr Significant cost savings Full control of the treatment process and long-term sustainability | 1 No |
| 13 | Jib Crane | 0-5 Ton Jib cranes are economical – It is cost-effective alternatives to traditional construction equipment, and they can be used in various settings. Jib cranes are efficient – They can move large objects quickly and easily, making them an ideal choice for projects requiring precision and speed. Maximum Lifting Capacity : 0-5 ton Jib Length : 8 mtr Max Height : 0-20 feet | 1 No |
| 14 | Mobile Crane | 10 Ton Mobile Crane Crane use Smooth Descent Valve(SDV). Speed up your crane extension. Operation & Control Smooth loading Capacity : 10 T Boom Length : Upto 10 meter | 1 No |

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| | | Lifting Capacity : 11.4 T | |
| 15 | Front end loader | <p>Bucket size 1.8-2.5 Cubic mtr Traction speed cycle time enhance loader work, keep the machine balance Transmission pipe Retain the load Bucket size : 1.8-2.6 Cubic mtr Gross Power : 25 HP Max Operating Weight : 5000 kg Max Dig Depth : 3000 mm</p> | 1 No |
| 16 | Power Generator | <p>10kva Power Generator is very easy and efficient to transmit over a long distance No need for matching a voltage Cost of ownership is lower They have a quiet operation Easier to maintain this generator Dimension: 1760 x 900 x 1225 mm. Engine Power: 24.8 HP (at 1500 rpm)</p> | 1 No |
| 17 | Air Compressor | <p>30C 30L 2HP An air compressor can also function at high temperatures and in locations where explosions and fire hazards restrict other forms of energy. Air can be generated on site, so there's more control over usage and air quality. Also, air compressors can run tools and equipment that generate more power than normal tools. Tank capacity : 30L Dimension: 24.4 x 11 inch</p> | 5 Nos |
| 18 | Artificial respirator | <p>Drager pss 3000 self contained artificial respiration, breathing induced by some manipulative technique when natural respiration has ceased or is faltering. Such techniques, if applied quickly and properly, can prevent some deaths from drowning, choking, strangulation, suffocation, carbon monoxide poisoning, and electric shock. Capacity : 1000-4000 ml Dimensions mm (H x W x D) 590 x 290 x 160</p> | 4 Nos |

Package D: Equipment for Short Term Training Courses

Lot 1: Equipment for Mining Mechanic/Fitter – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|--------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1 | Helmet | Protection against alternating voltage of up to 1000 V (AC) or direct voltage up to 1500 V (DC) | 15 Nos |
| 2 | Dust Mask | The most common dust masks is N95, which will filter 95% of airborne particles that are not oil-based. N95 covers most woodshop dust, allergens, and airborne diseases. Filters for painting are often rated R95, or higher to handle oil-based particles. | 15 Nos |
| 3 | Goggles | The main standard for safety goggles is EN 166 (personal eye protection specifications). Depending on the type of applications other EN standards may also be relevant (EN 167 - EN 175, EN 379 and several EN ISO standards for eye optics. | 15 Nos |
| 4 | Ear Plug | The highest NRR rating for earplugs is 33, and the highest available NRR rating for earmuffs is 31. These values reflect the level of noise protection available for each device when worn alone. Combining earplugs with earmuffs can offer a NRR protection level of 36. | 15 Nos |
| 5 | Gloves | "Abrasion Resistance (1-4) Abrasion testing is performed by using samples from key areas of the gloves, such as the palm or fingertips. Cut Resistance (1-5) Tear Resistance (1-4) Puncture Resistance (1-4)" | 15 Nos |
| 6 | Reflective Jacket | Saviour High Visibility Reflective Jacket made out of Polyester fabric with 1 7/2" wide Micro Prismatic reflective tape for night time vision. | 15 Nos |
| 7 | Safety Belt | The minimum width and thickness of webbing for waist straps shall be 40 mm and 3 mm respectively. The waist belts shoulder straps, hoisting straps, sole straps and all types of belts and harnesses shall not break under a minimum tensile load of 19.6 kN (2 000 kg). | 5 Set |
| 8 | Gum Boots | Hardness Sole/Heel 60 +/- 5 deg A Leak Proof No leakage when air with pressure of 1.5 Kg is forced into the Boot Design Wellington Thickness "i) Sole (overall) 12.5 mm ii) Heel (overall) 28.0 mm" | 15 Set |
| 9 | Fire Extinguisher Cylinders | CO2 cartridge 100 g capacity for 5 kg capacity and 200 g capacity for 10 kg capacity shall conform to IS 4947. The capacity of gas cartridge shall be 120 g for 5 kg and 180 to 200 g for 10 kg. The plunger rod shall be of such a length that it has a minimum stroke of 7mm. | 2 Nos |
| 10 | First Aid Box | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. | 2 Nos |

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| | | Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | |
| 11 | Fire Fighting Charts | The selection, installation and maintenance of fire extinguishers are covered in IS 2190: 1979 'Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision)' This standard covers requirements in respect of installation and maintenance of internal fire hydrants | 1 Set |
| 12 | First Aid Charts | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 1 Set |
| 13 | Computer/Desktop | Desktop (Intel Core i3-10110U/8GB/512GB SSD/Windows 11/MS Office 2021/HD 720p Camera/Wireless Keyboard & Mouse/Black), F0E800Y7IN | 1 No |
| 14 | Lcd Projector | 4000 Lumens High Brightness, 22000:1 High Contrast Ratio, Dual HDMI, Upto 15000 hrs Extra-Long Lamp Life, 10W Speaker, 3D Capable | 1 No |
| 15 | Multi Meter | Voltage DC Accuracy1 $\pm(0.09\% + 2)$ Voltage AC Max. resolution 0.1 mV Maximum 1000 V Current DC Accuracy1 $\pm(1.0\% + 3)$ | 1 Set |
| 16 | Hydrometer | Stem diameter: Shall not be less than 5.5mm and shall not greater than 8mm. Bulb diameter of the thermometer: shall not be greater than the stem diameter. Colour of indicator: red/green The thermometer shall comply: IS 2480. Maximum overall length of hydrometer: 400mm. | 1 Set |
| 17 | Torque Wrenches | 3.1 Operating Torque : Between 200 Nm to 2500Nm 3.2 Weight : approx 7 kg 3.3 Square size : 3/4" (approx 19 mm) 3.4 Ratchet type : Push-through 3.5 Ratchet teeth :Fine 60 to 70 teeth 3.6 Length : 800 mm to 1200mm 3.7 Length (incl ext Handle) : 1500 mm 3.8 Accuracy : +/- 3% 3.9 Standard socket size required : Std 12 to 42 | 1 Set |
| 18 | Engine Assembly (Petrol Or Diesel) | An engine assembly takes the long block, takes the intake manifolds, covers valve covers, as well as the oil pan, water pump, etc. Exhaust manifolds and ignition distributors come with certain rebuilders. | 1 Set |
| 19 | Clutch Plate | Size & Specification : 14" (352mm) 8 Springs. The majority of new discs measure . 312-. 315" (7.93 – 8.00mm) thick – fully worn is . 275" (7.00mm) or below. | 1 Set |
| 20 | Gearbox | Gear box shall be Double helical type. Split Gear wheel is Not Acceptable. Maximum permissible Noise Level should be within 85 dB(A) at a distance of 1m. The gearbox shall be able to withstand 20% of overspeed for a period of minimum five minutes. | 1 Set |
| 21 | Rear Axle | The most popular rear-end ratio in trucks today is the 3:55, which sort of averages towing power and fuel economy.The number is expressed in a ratio, which represents the number of teeth on the ring gear divided by the number of teeth on the pinion. For example, a truck with a 3.73:1 gear ratio means | 1 Set |

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| | | that the driveshaft will turn 3.73 times for each complete wheel spin. | |
| 22 | Front Axle | The front axle consists of front wheel hub assembly, knuckles and driveshafts | 1 Set |
| 23 | Pressure Plate | The pressure plate, as its name implies, applies pressure to the clutch disc for the transfer of torque to the transmission. A small amount of thread locking compound is recommended on all clutch fasteners. DO NOT use a washer with this pressure plate bolt. Tighten all bolts evenly, ¼ turn at a time in a crisscross pattern until pressure plate is completely drawn-up to the flywheel. Final torque to: 35 - 38 ft/lbs. | 1 Set |
| 24 | Cut model of engine assembly | These are used for Training purpose An engine assembly takes the long block, takes the intake manifolds, covers valve covers, as well as the oil pan, water pump, etc. Exhaust manifolds and ignition distributors come with certain rebuilders. | 1 Set |
| 25 | Model of transmission system | An engine is a device that converts different types of energy into mechanical output while a transmission is an instrument that controls the use of power generated by an engine in a power transmission system. Transmission is a part of the engine that transforms power into torque. Torque is a force that rotates an object—like a wheel—around an axis or axle. The transmission uses a flywheel, pressure plate and clutch to engage and disengage the engine from the transmission. The flywheel and pressure plate are connected to the engine. The clutch is sandwiched between them and is splined to the transmission input shaft. A gear ratio is the ratio of the number of rotations of a driver gear to the number of rotations of a driven gear. | 1 Set |
| 26 | Clutch Plate | Size & Specification : 14" (352mm) 8 Springs. The majority of new discs measure . 312-. 315" (7.93 – 8.00mm) thick – fully worn is . 275" (7.00mm) or below. | 1 Set |
| 27 | Propeller Shaft | The propeller shafts must be strong enough, low notch sensitivity factor, having heat treated and high wear resistant property so that it can sustain high bending and torsional load. The common material for construction is high quality steel of grade SM45C. | 1 Set |
| 28 | Break Assembly unit | Break Assembly is the collective replacement parts used to repair an automobile's worn down brakes. brake booster master cylinder brake line wheel brake assembly emergency brake four major parts of a disc brake assembly caliper | 1 Set |
| 29 | Tyre Repair Kit | Material Plastic Brand generic Dimension Rasper Tool Dimension: ~13.5(L) x 10.8(W) x 2.3(T)cm Needle Tool Dimension: ~15(L) x 10.8(W) x 2.4(T) | 1 Set |
| 30 | Self Starter Assembly | These starters consist of either magnet or DC motor and a starter solenoid attached at the top of it. When you switch ignition on, DC power is supplied to a solenoid which meshes the pinion with the starter ring gear on the flywheel. Different variations of the electric and magnetic starter are used in | 1 Set |

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| | | recent times. | |
| 31 | Alternator Assembly | Inside the alternator, there are several main component assemblies. This shows the rotor and field wires. With the rotor removed, the stator windings are exposed. This is where the AC voltage is created. The stationary windings of the alternator are called the stator. | 1 Set |
| 32 | Horn Assembly | The Indian Standard - 1884 "Automotive Vehicles – Electric Horn – Specification" specified the requirements considering the horns as a component. This standard is intended to cover the installation requirements of horn, when fitted on the vehicle. A typical car horn consists of a flexible metal diaphragm (usually made of spring steel), a coil of wire that forms an electromagnet, a switch and a housing that functions somewhat like a megaphone. | 1 Set |
| 33 | Wiper Motor Assembly | Motor Voltage 12-24 V Material Iron, Stainless Steel, Aluminium Power 14 W Rated Voltage 13.5 V Speed 45 RPM | 1 Set |
| 34 | Tyre Pressure Meter | Range: 0 to 60, 100, 150 and 200 Psi. Size: 63 mm (2.5 inch) TTC : 7" long TTC with air chuck. Case: M.S. drawn, protected with soft cover. Hose: 18" long PVC hose. | 1 Set |
| 35 | Vehicle Driver Tool Box | " Light and Heavy Duty Tools Hammer. The basic tool that makes you a certified do-it-yourselfer is a hammer. Screwdrivers. A good set of screwdrivers is mandatory to any basic tool kit. Pry Bar. Wrenches. Pliers. Ratchet and Socket Sets. Allen Wrenches. Heavy Duty Scissors. | 1 Set |
| 36 | Vehicle Log Book | Vehicle Log book a) Length and Width (Not less than) = 20.5 cm X 32 cm, Bleeding (Binding Space) = 2cm. | 1 Set |
| 37 | Air Inflating Pump | Complex and versatile, high-pressure air compressors take ambient air through several stages of compression in order to supply a consistent pressure of up to 6,000 psi. The air is cooled as it moves through each stage in order to compress as much as possible. This allows for optimal amounts of pressure. | 1 Set |
| 38 | Cut model of pump | These are used for Training purpose Motor capacity 1 HP Shut Off Dynamic Head 12 metres Module mounting structure MS hot dipped galvanised, at least three times manual tracking facilities Water Output * 81,000 litres per day from a total head of 10 metres. | 1 Set |
| 39 | cut model of compressor | These are used for Training purpose Horse Power 5 HP Capacity 1.5 Ton Compressor Technology Centrifugal Compressor | 1 Set |

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| | | Air Tank Capacity 1.5 Ton | |
| 40 | Typical Vehicle Servicing Chart | Checks during a vehicle servicing include the engine oil, oil filter, lights, tyres, bodywork, exhausts, brakes, steering, fluid and coolant levels, suspension and 12V battery. | 1 Set |
| 41 | Tyre Rotation Chart | It is advised to get the tyres rotated once every six months or 8,000 to 10,000 kilometres, whichever is earlier. As a rough estimate, you can get the tyres rotated every time you change the engine oil. | 1 Set |
| 42 | Bench-Vice & Line-Vice | Bench Vices Size: 4" TO 8" Jaw Opening: 4 Inch, 5 Inch, 6 Inch, 8 Inch. Base Type: Fixed. Jaw Width: 6" | 1 Set |
| 43 | Pressure Plate | The pressure plate, as its name implies, applies pressure to the clutch disc for the transfer of torque to the transmission. A small amount of thread locking compound is recommended on all clutch fasteners. DO NOT use a washer with this pressure plate bolt. Tighten all bolts evenly, ¼ turn at a time in a crisscross pattern until pressure plate is completely drawn-up to the flywheel. Final torque to: 35 - 38 ft/lbs. | 1 Set |

Lot 2: Equipment for Mine Electrician – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1 | Helmet | Protection against alternating voltage of up to 1000 V (AC) or direct voltage up to 1500 V (DC) | 15 Nos |
| 2 | Dust Mask | The most common dust masks is N95, which will filter 95% of airborne particles that are not oil-based. N95 covers most woodshop dust, allergens, and airborne diseases. Filters for painting are often rated R95, or higher to handle oil-based particles. | 15 Nos |
| 3 | Goggles | The main standard for safety goggles is EN 166 (personal eye protection specifications). Depending on the type of applications other EN standards may also be relevant (EN 167 - EN 175, EN 379 and several EN ISO standards for eye optics. | 15 Nos |
| 4 | Ear Plug | The highest NRR rating for earplugs is 33, and the highest available NRR rating for earmuffs is 31. These values reflect the level of noise protection available for each device when worn alone. Combining earplugs with earmuffs can offer a NRR protection level of 36. | 15 Nos |
| 5 | Gloves | "Abrasion Resistance (1-4) Abrasion testing is performed by using samples from key areas of the gloves, such as the palm or fingertips. Cut Resistance (1-5) Tear Resistance (1-4) Puncture Resistance (1-4)" | 15 Nos |
| 6 | Reflective Jacket | Saviour High Visibility Reflective Jacket made out of Polyester fabric with 1 7/8" wide Micro Prismatic reflective tape for night time vision. | 15 Nos |
| 7 | Safety Belt | The minimum width and thickness of webbing for waist straps shall be 40 mm and 3 mm respectively. The waist belts shoulder straps, hoisting straps, sole straps and all types of belts and harnesses shall not break under a minimum tensile load of 19.6 kN (2 000 kg). | 5 Set |
| 8 | Gum Boots | Hardness Sole/Heel 60 +/- 5 deg A Leak Proof No leakage when air with pressure of 1.5 Kg is forced into the Boot Design Wellington Thickness "i) Sole (overall) 12.5 mm ii) Heel (overall) 28.0 mm" | 15 Set |
| 9 | Fire Extinguisher Cylinders | CO2 cartridge 100 g capacity for 5 kg capacity and 200 g capacity for 10 kg capacity shall conform to IS 4947. The capacity of gas cartridge shall be 120 g for 5 kg and 180 to 200 g for 10 kg. The plunger rod shall be of such a length that it has a minimum stroke of 7mm. | 2 Nos |
| 10 | First Aid Box | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 2 Nos |

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| 11 | Fire Fighting Charts | The selection, installation and maintenance of fire extinguishers are covered in IS 2190: 1979 'Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision)' This standard covers requirements in respect of installation and maintenance of internal fire hydrants | 1 Set |
| 12 | First Aid Charts | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 1 Set |
| 13 | Computer/Desktop | Desktop (Intel Core i3-10110U/8GB/512GB SSD/Windows 11/MS Office 2021/HD 720p Camera/Wireless Keyboard & Mouse/Black), FOE800Y7IN | 1 No |
| 14 | Lcd Projector | 4000 Lumens High Brightness, 22000:1 High Contrast Ratio, Dual HDMI, Upto 15000 hrs Extra-Long Lamp Life, 10W Speaker, 3D Capable | 1 No |
| 15 | Connection Bushing Terminal | Bushings are electrical equipment devices designed to distribute electric power and energy through a grounded barrier, such as the wall of a transformer or switchgear. A bulk type bushing consists of a central conducting rod usually manufactured from copper or aluminium, which is encased by an insulator. The surrounding insulator may be manufactured from porcelain or composite resin silicon rubber. Due to dielectric strength limitations, the use of bulk type bushings is restricted to system voltages of 72 kV and below. At higher system voltages, condenser bushings are used. | 1 Set |
| 16 | Bus Bar | All busbars system shall have short circuit rating of not less than 75 kA at 415 volts for 3 seconds. Bus bar Cross Section Area as per Short Circuit= $50000X\sqrt{((1.166/(100 \times 100)) \times (1 + 0.00403 \times 85)) \times 1}$. Bus bar Cross Section Area as per Short Circuit=626 Sq.mm. Select Higher Size for Bus bar Cross section area between 436 Sq.mm and 626 Sq.mm. Final Calculated Bus Bar Cross Section Area =626 | 1 Set |
| 17 | MCCB | The MCCB can carry a rate of current as high as 2500 amperes with an operating current range of 25 to 630 amperes. While both types are designed with either a thermal or thermo-magnetic trip, the MCCB can additionally possess an electric trip. ambient temp 40 °C breaking capacity Ics=Icu=100% (4 5kA / 65 kA / 85 kA) no. of poles 3P & 4P operating altitude 2000 m rated frequency (50/60) Hz | 1 Set |
| 18 | China Clay Oil Filled Insulator | flash point 140 °C or greater, pour point -40 °C or lower, dielectric breakdown voltage 28 kV (RMS) or greater High Flash Point: To minimise risk of the formation of a flammable mixture of oil vapour and air at high operating temperatures. Low Pour Point: To reduce risk of inefficient cooling or of | 1 Set |

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| | | slow O.C.B. | |
| 19 | Board Switch | Generally the switches have an average operating frequency of 100 cycles per minute. Normally for a switch the mechanical operating frequency is slightly greater than the electrical operating frequency. Switchboards typically have a maximum voltage rating of 600 Vac/Vdc and a maximum bus rating of 6000 A | 1 Set |
| 20 | Power Supply Monitor Panel Board | The power supply module is the power house that energizes the PLC to carry out its function. Universal input means the power source input range is within AC 85 ~ 264 Volt and capable of operating at 50 and 60 Hz. These power supplies can be used anywhere without adjusting a select switch for the input power. | 1 Set |
| 21 | Megger | It can provide high DC voltages (typically in ranges from 500 V to 5 kV, some are up to 15 kV) at specified current capacity, are used. Acceptable insulator resistance values are typically 1 to 10 megohms, depending on the standards referenced. | 1 Set |
| 22 | Soldering Iron And Consumables | Bit Size 3.0mm Chisel Power 25 Watts Supply 240Vac | 5 Sets |
| 23 | Clamp Meter | AC current Range 40.00 A / 400.0 A DC voltage Range 600.0 V Accuracy 1.0% ± 5 digits Resistance Range 400.0 Ω / 4000 Ω / 40.00 kΩ | 1 Set |
| 24 | Digital Multi Meter | Voltage DC Accuracy $1 \pm (0.09\% + 2)$ Voltage AC Max. resolution 0.1 mV Maximum 1000 V Current DC Accuracy $1 \pm (1.0\% + 3)$ | 2 Sets |
| 25 | Switchgear | The switchgear shall have a voltage rating of (4.76/8.25/15/27) kV | 1 Set |
| 26 | Screw Driver Set | Screwdriver specifications are generally expressed as head type*length, for example, a flat-blade screwdriver is 6*100, 6 is the head type of the rod, and the diameter of the rod, 100 is the length of the rod, without the handle part | 1 Set |
| 27 | Neo Tester | Operating Temperature 0 to 40 Deg C Resolution 1024 x 768 pixels (minimum) Sampling Rate 1000 Samples/sec | 1 Set |
| 28 | Combination Pliers | Heavy duty 5" to 8" combination pliers. Induction hardened cutting edges. Serrated jaws. Brushed finished, precision machined jaws. General purpose pliers for cutting hard and soft wires and cables. | 2 Sets |
| 29 | Nose Pliers | 6.69 inch Needle Long Nose Plier Can be Used in Small areas, Gripping, Cutting. | 2 Sets |
| 30 | Spanner Set | Double-ended spanner Ring spanner Light and Heavy duty spanner | 2 Sets |
| 31 | Adjustable Wrench | Adjustable wrenches are measured by the length of the handle. So, an 8-inch adjustable wrench has a handle that's 8 inches long, and a 12-inch adjustable wrench has a handle that's 12 inches long. | 2 Sets |
| 32 | Pipe Wrench | Pipe wrenches are classified by the length of the handle. They are generally available in sizes from 6 inches (150 mm) to 48 inches (1,200 mm) or larger. They are usually made of cast | 2 Sets |

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| | | steel. Today, aluminium might be used to construct the body of the wrench, although the teeth and jaw remain steel. | |
| 33 | Measuring Tape | A 16ft tape measure, for example, will have sixteen one-foot marks along its length and 192 one-inch marks (12 inches per foot). Each inch will then have eight 1/8th of an inch and sixteen 1/16th of an inch marks. 1 inch = 16 x 1/16th of an inch, 8 x 1/8th of an inch, 4 x 1/4 of an inch or 2 x 1/2 of an inch. | 2 Sets |
| 34 | Hack Saw | 300 x 12.5 x 0.6 mm. 18TPI, 24TPI, 32TPI. HCS, Bi-metal, HSS. Size: 12" x 1/2" x 0.6 (18TPI, 24TPI, 32TPI) Material: HSS, bi-metal. Used for cutting metal. Packing: Blister card, paper box or plastic box. | 2 Sets |
| 35 | Hammer | The head is made of drop-forged carbon steel, while the wooden handle must be capable of absorbing shock. Hammers are classified by the weight of the head and the length of the handle. The common curved claw hammer has a 7-20 oz (0.2-0.6 kg) head and a 12-13 in (30.5-33.0 cm) handle. A framing hammer, which normally drives much larger nails, has a 16-28 oz (0.5-0.8 kg) head and a 12-18 in (30.5-45.5 cm) handle. | 1 Set |
| 36 | Chisel | Wood chisels commonly range from 6mm to 50mm (1/4" to 2"), typically rising in 2mm (5/64") increments. Wood chisel, straight bevel edges blade. Hardness: HRC 58. Width of the blade: 10mm or 20mm or 40mm as per contract. Length: 250mm minimum. Minimum thickness of the blade at the thickest end, according to the width | 2 Sets |
| 37 | Files Set | Rough File. In this type of file, teeth are of big size and less in number. Bastard File. Teeth of this file are comparatively smaller than those of the rough file. Second-cut File. This is a file of medium grade. Smooth File. Dead Smooth File. | 1 Set |
| 38 | Wood Saw | They can vary from 6" to 12" and 22" to 24" plus more depending on the type of saw. | 1 Set |
| 39 | Portable Drill Machine | Powerup 10mm 600W Impact Drill 600 W 2700 rpm Bellstone 13mm Electric Drill 650 W 2600 rpm Prince PDH-13 Silver Hand Drill with Hammer 550W 2700 rpm Elmico 550W Heavy Duty Impact Drill Hammer Machine 550W 0-2750 rpm | 1 Set |
| 40 | Bench-Vice & Line-Vice | Bench Vices Size: 4" TO 8" Jaw Opening: 4 Inch, 5 Inch, 6 Inch, 8 Inch. Base Type: Fixed. Jaw Width: 6" | 1 Set |
| 41 | Modal of sub-station for illustration purpose | Requirements Of a Good Substation Earthing. Maximum Permissible Resistance Of Earthing System. Touch Voltage (E-TOUCH) Step Voltage (E STEP) | 1 Set |

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| | | Earthing System In a Substation. | |
| 42 | Single phase transformer 2 KVA | Type 2 KVA Single Phase Primary & Secondary Voltage As per Customer Requirement Frequency 50/60 Hz Core Lamination CRNO/CRGO | 1 Set |
| 43 | 3 phase transformer oil filled 10 KVA | Power Rating 10kVA Number of Phase 3-Phase Voltage Ratio 415V/380V Cooling Type Air Cooled Winding Material Copper | 1 Set |
| 44 | 3 phase squirrel cage Induction motors 5HP | Power Rating 3.7 kW Speed 1420 rpm Phase Three Phase | 1 Set |
| 45 | Modal of continuity of circuits | If multimeter reads 0 ohms, it means that there is perfect continuity in the wire, fuse, battery, or device. | 1 Set |
| 46 | Heavy duty cutter | Cutting Accuracy $\pm 0.5\text{MM}$ (L x 0.02%) Depends on the materials Motor Power 2000 watts Weight 120 Kgs. Wire Cutting Length 1mm to 9999 mm Diameter Of Wire 120 sq mm | 1 Set |
| 47 | Electric knife | Motor handle. Stylish, ergonomoc design houses the powerful motor. On/off button. Press to start your electric knife, relase to stop it. Blade release button. Press to release the blades for cleaning, storage, etc Stainless steel blades. Safety grips. Blade rivet and slot. Carving blade. Bread blade. | 1 Set |
| 48 | Connector | Aspects from the number of insertions to the contact resistance, current carrying capability, ease of wiring the connector and a host of other parameters are all important when making the selection for the electronic design. | 1 Set |
| 49 | Lug | Lug code A5-M6 - Conductor Size Stranded Copper 25sqmm, Cable Lug Dimensions 6.4mm Lug code A5-M8 - Conductor Size Stranded Copper 25sqmm, Cable Lug Dimensions 8.4mm Lug code A5-M10 - Conductor Size Stranded Copper 25sqmm, Cable Lug Dimensions 10.5mm Lug code A5-M12 - Conductor Size Stranded Copper 25sqmm, Cable Lug Dimensions 13.2mm | 1 Set |
| 50 | Wire gauge | AWG gauge Diameter Inches Ohms per 1000 ft 1 0.2893 0.1239 2 0.2576 0.1563 3 0.2294 0.1970 4 0.2043 0.2485 | 1 Set |
| 51 | Battery charger | Trickle charge voltage 34.50 volts (2.3V per cell) at 400 mA maximum. Boost charge voltage 42 volts (2.75 V per cell) at 14 amps. | 1 Set |
| 52 | Blow lamp | A blow lamp is a portable tool which produces a flame for various heat applications such as soldering. To fuel the flame, the blow lamp is attached to a gas canister that contains one of several types of gas, including propane and butane. | 1 Set |
| 53 | Pulley puller | the center bolt diameter must be at least $\frac{1}{2}$ the diameter of the shaft from which the object is being removed Bearing pullers are measured according to their reach. The puller's reach is the available distance between the pulling surface of the legs and the head of the legs. When the legs are | 1 Set |

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| | | opened, the distance increases and decreases. Bearing pullers come in sizes of 75mm (2.9"), 100mm (3.9"), 150mm (5.9") and 200mm (7.8"). | |
| 54 | Hydrometer | Stem diameter: Shall not be less than 5.5mm and shall not greater than 8mm. Bulb diameter of the thermometer: shall not be greater than the stem diameter. Colour of indicator: red/green The thermometer shall comply: IS 2480. Maximum overall length of hydrometer: 400mm. | 1 Set |
| 55 | Tong tester | a) AC Current Measurement: 0-20/50/500 /1000 Amp b) AC/DC Voltage Measurement:- 0 to 300 V / 600 V. c) Resistance Measurement : - 400 Ohms to 4 K Ohms. ACCURACY For AC current $\pm 3\%$ reading with resolution of 0.1 upto 100 A, 1.0 upto 500 / 1000 A. | 1 Set |
| 56 | Cable | An electrical cable is classified by two numbers separated by a hyphen, such as 14-2. The first number denotes the conductor's gauge; the second denotes the number of conductors inside the cable. For instance, 14-2 has two 14-gauge conductors: a hot and a neutral | 1 Set |
| 57 | Cable tray | Ladder Tray dimensions : 450mm x 100mm x 20mm, 2500mm length 600mm x 100mm x 20mm, 2500mm length Perforated tray dimensions: 300mm x 100mm x 15mm 2500mm length. Coupler plates shall be made out of 3mm thick steel sheet and dimensions as per drg. | 1 Set |
| 58 | Line tester | Working Voltage 1100V dc max Threshold Voltage 200Vac/300Vdc Circuit current <10mA Indicator 3 ultra-bright red LED | 1 Set |
| 59 | Lead acid Batteries | Specific energy 35–40 Wh/kg Cycle durability <350 cycles Nominal cell voltage 2.1 V Charge temperature interval Min. -35°C , max. 45°C | 1 Set |
| 60 | "Gate end box with female socket: single font, single door and stand mounted with bottom cable entry system": | A flameproof enclosure primarily for use at or near the coalface and designed to line up with similar boxes to form a control board. A gate-end box may contain bus bars, isolators, switches, contactors, transformers, and protective devices, for the control of motors, lighting, and other equipment. Main Safety Provisions of Gate End Box Overload or short circuit protection. Lower voltage or power failure protection. Earth continuity protection. Pilot protection. | 1 Set |
| 61 | No/Nc push buttons | Terminal color distinguishes NO and NC contacts Some push button switches can be distinguished from the color of the terminal. This is to avoid operation errors. Generally, the button caps are made of different colors. Green (or blue) is NO contact, and red (or pink) is NC contact. "Normally Open" is what the abbreviation "NO" means. "Normally Closed" is the meaning of the abbreviation "NC". | 1 Set |
| 62 | Electric Grinder | Operating Voltage 230V 50Hz Power 950 W Speed (No Load) 11000 rpm Weight 1.8 Kg | 1 Set |

Lot 3: Equipment for Loader Operator – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1 | Helmet | Protection against alternating voltage of up to 1000 V (AC) or direct voltage up to 1500 V (DC) | 15 Nos |
| 2 | Dust Mask | The most common dust masks is N95, which will filter 95% of airborne particles that are not oil-based. N95 covers most woodshop dust, allergens, and airborne diseases. Filters for painting are often rated R95, or higher to handle oil-based particles. | 15 Nos |
| 3 | Goggles | The main standard for safety goggles is EN 166 (personal eye protection specifications). Depending on the type of applications other EN standards may also be relevant (EN 167 - EN 175, EN 379 and several EN ISO standards for eye optics. | 15 Nos |
| 4 | Ear Plug | The highest NRR rating for earplugs is 33, and the highest available NRR rating for earmuffs is 31. These values reflect the level of noise protection available for each device when worn alone. Combining earplugs with earmuffs can offer a NRR protection level of 36. | 15 Nos |
| 5 | Gloves | "Abrasion Resistance (1-4) Abrasion testing is performed by using samples from key areas of the gloves, such as the palm or fingertips. Cut Resistance (1-5) Tear Resistance (1-4) Puncture Resistance (1-4)" | 15 Nos |
| 6 | Reflective Jacket | Saviour High Visibility Reflective Jacket made out of Polyester fabric with 1 7/8" wide Micro Prismatic reflective tape for night time vision. | 15 Nos |
| 7 | Safety Belt | The minimum width and thickness of webbing for waist straps shall be 40 mm and 3 mm respectively. The waist belts shoulder straps, hoisting straps, sole straps and all types of belts and harnesses shall not break under a minimum tensile load of 19.6 kN (2 000 kg). | 5 Set |
| 8 | Gum Boots | Hardness Sole/Heel 60 +/- 5 deg A Leak Proof No leakage when air with pressure of 1.5 Kg is forced into the Boot Design Wellington Thickness "i) Sole (overall) 12.5 mm ii) Heel (overall) 28.0 mm" | 15 Set |
| 9 | Fire Extinguisher Cylinders | CO2 cartridge 100 g capacity for 5 kg capacity and 200 g capacity for 10 kg capacity shall conform to IS 4947. The capacity of gas cartridge shall be 120 g for 5 kg and 180 to 200 g for 10 kg. The plunger rod shall be of such a length that it has a minimum stroke of 7mm. | 2 Nos |
| 10 | First Aid Box | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 2 Nos |

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| 11 | Fire Fighting Charts | The selection, installation and maintenance of fire extinguishers are covered in IS 2190: 1979 'Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision)' This standard covers requirements in respect of installation and maintenance of internal fire hydrants | 1 Set |
| 12 | First Aid Charts | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 1 Set |
| 13 | Computer/Desktop | Desktop (Intel Core i3-10110U/8GB/512GB SSD/Windows 11/MS Office 2021/HD 720p Camera/Wireless Keyboard & Mouse/Black), F0E800Y7IN | 1 No |
| 14 | Lcd Projector | 4000 Lumens High Brightness, 22000:1 High Contrast Ratio, Dual HDMI, Upto 15000 hrs Extra-Long Lamp Life, 10W Speaker, 3D Capable | 1 No |
| 15 | Loader | The capacity of a loader bucket can be anywhere from 0.5 to 36 m3 depending upon the size of the machine and its application. The front loader's bucket capacity is generally much bigger than a bucket capacity of a backhoe loader. | 1 Set |
| 16 | Tyre Pressure Meter | Range: 0 to 60, 100, 150 and 200 Psi. Size: 63 mm (2.5 inch) TTC : 7" long TTC with air chuck. Case: M.S. drawn, protected with soft cover. Hose: 18" long PVC hose. | 2 Sets |
| 17 | Vehicle Driver Tool Box | Light and Heavy Duty Tools Hammer. The basic tool that makes you a certified do-it-yourselfer is a hammer. Screwdrivers. A good set of screwdrivers is mandatory to any basic tool kit. ... Pry Bar. Wrenches. Pliers. Ratchet and Socket Sets. Allen Wrenches. Heavy Duty Scissors. | 2 Sets |
| 18 | Vehicle Log Book | Vehicle Log book a) Length and Width (Not less than) = 20.5 cm X 32 cm, Bleeding (Binding Space) = 2cm. | 2 Sets |
| 19 | Slide wrench | Size: 305 mm, Sided: Single Sided, Maximum Opening: 35 mm, Jaw Size Scale: Yes, Material: Steel. Dimensions - Depth: 18 | 2 Sets |
| 20 | Spanner Set | Double-ended spanner Ring spanner Light and Heavy duty spanner | 2 Sets |

Lot 4: Equipment for Dumper Operator – 1 Set

| SL No | Name of the item | Minimum Technical Specifications | Qty. |
|-------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1 | Helmet | Protection against alternating voltage of up to 1000 V (AC) or direct voltage up to 1500 V (DC) | 15 Nos |
| 2 | Dust Mask | The most common dust masks is N95, which will filter 95% of airborne particles that are not oil-based. N95 covers most woodshop dust, allergens, and airborne diseases. Filters for painting are often rated R95, or higher to handle oil-based particles. | 15 Nos |
| 3 | Goggles | The main standard for safety goggles is EN 166 (personal eye protection specifications). Depending on the type of applications other EN standards may also be relevant (EN 167 - EN 175, EN 379 and several EN ISO standards for eye optics. | 15 Nos |
| 4 | Ear Plug | The highest NRR rating for earplugs is 33, and the highest available NRR rating for earmuffs is 31. These values reflect the level of noise protection available for each device when worn alone. Combining earplugs with earmuffs can offer a NRR protection level of 36. | 15 Nos |
| 5 | Gloves | "Abrasion Resistance (1-4) Abrasion testing is performed by using samples from key areas of the gloves, such as the palm or fingertips. Cut Resistance (1-5) Tear Resistance (1-4) Puncture Resistance (1-4)" | 15 Nos |
| 6 | Reflective Jacket | Saviour High Visibility Reflective Jacket made out of Polyester fabric with 1 7/8" wide Micro Prismatic reflective tape for night time vision. | 15 Nos |
| 7 | Safety Belt | The minimum width and thickness of webbing for waist straps shall be 40 mm and 3 mm respectively. The waist belts shoulder straps, hoisting straps, sole straps and all types of belts and harnesses shall not break under a minimum tensile load of 19.6 kN (2 000 kg). | 5 Set |
| 8 | Gum Boots/Safety Shoes | Hardness Sole/Heel 60 +/- 5 deg A Leak Proof No leakage when air with pressure of 1.5 Kg is forced into the Boot Design Wellington Thickness "i) Sole (overall) 12.5 mm ii) Heel (overall) 28.0 mm" | 15 Set |
| 9 | Fire Extinguisher Cylinders | CO2 cartridge 100 g capacity for 5 kg capacity and 200 g capacity for 10 kg capacity shall conform to IS 4947. The capacity of gas cartridge shall be 120 g for 5 kg and 180 to 200 g for 10 kg. The plunger rod shall be of such a length that it has a minimum stroke of 7mm. | 2 Nos |
| 10 | First Aid Box | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 2 Nos |

| | | | |
|-----------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 11 | Fire Fighting Charts | The selection, installation and maintenance of fire extinguishers are covered in IS 2190: 1979 'Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision)' This standard covers requirements in respect of installation and maintenance of internal fire hydrants | 1 Set |
| 12 | First Aid Charts | A first-aid manual. Different sized sterile gauze pads. Adhesive tape. Band-Aids in several sizes. Elastic bandage (like an Ace wrap) Antiseptic wipes. Antibiotic ointment. Antiseptic solution (like hydrogen peroxide) | 1 Set |
| 13 | Computer/Desktop | Desktop (Intel Core i3-10110U/8GB/512GB SSD/Windows 11/MS Office 2021/HD 720p Camera/Wireless Keyboard & Mouse/Black), F0E800Y7IN | 1 No |
| 14 | Lcd Projector | 4000 Lumens High Brightness, 22000:1 High Contrast Ratio, Dual HDMI, Upto 15000 hrs Extra-Long Lamp Life, 10W Speaker, 3D Capable | 1 No |

Package E: Mining Simulators and Softwares

Lot 1: Dumper Simulator & Softwares – 1 No.

| SL No | Technical Specification | Description |
|--------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HARDWARE SPECIFICATIONS | | |
| 1 | OPERATOR STATION – MOCKUP | The operator station of the simulator consists of generic hardware controls as seen in a Dumper. Vehicle instruments & controls including the seat are positioned ergonomically in correct locations & behave and operate as they do in the actual machine. It is a fully functional preconfigured simulator that contains all necessary Hardware and Software modules, visual system, visual database and a fully functional driving console with an active instrument panel to provide real life driving environment. Surround sound system provides a realistic representation of own machine in operation & the sound of other machines & virtual working environment in the scene. |
| 2 | OPERATOR DISPLAY SCREEN | * Display through: 80 Curved Screen Projection Display – 180 Degree Field of View: Curved Screen Display offers a world-class visual experience through its proprietary curved screens and seamless display systems. and Curved screen with multiple channel projection systems provides a soft edge blending to create a continuous "Seamless Display". This not only offers high resolution, but also provides you a "More Realistic and Immersive Training. |
| 3 | INTEGRATED MOTION (IN MOTION) SYSTEM | 3 DoF Motion Platform In-Motion 3 Degrees of Freedom is a state of the art electric motion platform providing accurate feedbacks required for realistic mine operations. These are sleek, portable and maintenance free. It eliminates the challenges of the bulky conventional systems. In-Motion platforms are programmed to provide all necessary sensations required for a realistic operation and training experience. These motion platforms provide realistic simulation feedback with senses of acceleration, braking, turning, jerks, gradients and soil interaction. They are upgradable and are designed to suit the entire range of Simulators. |
| 4 | INSTRUMENT CLUSTER | Following elements of instrument cluster of actual vehicle are fully integrated & activated with simulator Graphics. Speedometer Head light indicator High beam indicator Hazard switch Parking brake indicator Seatbelt indicator Note: Instrument Cluster is activated on a separate LED screen fitted on the dashboard. |
| 5 | INSTRUCTOR OPERATOR STATION (IOS) | The Instructor can control the training process. This station allows the instructor to create scenarios, record & playback the movements of the trainee/ operator for a better training. The instructor station is displayed on a Single 20” LED Screen. The Instructor station features are explained below. |

| | | |
|-----------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | PROCESSING TYPE | High End Computer Systems |
| 7 | ELECTRIC SUPPLY | 220 – 240 volts |
| 8 | REALISTIC SOUND ENVIRONMENT | <p>Simulator gives high quality stereophonic representation of sound without clutter & captures following elements:</p> <ul style="list-style-type: none"> · Starting ignition sound · Vehicle engine sound · Surrounding traffic noise · Horn · Rain drops · Wind shield wiper · Screeching brake sound · Indicator's ticking sound |
| SOFTWARE SPECIFICATIONS (for 30 users) | | |
| 9 | EQUIPMENT TYPE | The software will be based on generic Dumper or Tipper. The 3D model and vehicle dynamics will replicate dumper functionalities. Software with free license for unlimited users and free upgradations in future. |
| 10 | VIRTUAL ENVIRONMENT – GENERIC OPEN CAST MINE SITE | Dumper/ Tipper Simulator is delivered with a highly realistic 3D simulated Generic mining site – Open cast with artificially intelligent automated equipment's such as haul trucks, excavators, wheeled loaders, dozers, light vehicles. The environment may be uniquely configured to address almost any training requirement. Realistic material interaction ensures realistic learning training to the operators. |
| 11 | DRIVING SCENARIOS | <p>The driving scenarios included in the simulated environment are:</p> <ul style="list-style-type: none"> - Garage to Pit: Driving from Garage with no load to pit for loading the dumper. - Pit to Dump waste material: Hauling from pit to dump the waste material. - Pit to Crusher: Hauling from Pit to Crusher to unload the material at crusher. - Dump material Haul Cycle - Crusher material Haul Cycle |
| 12 | SIMULATED MODES / TIME OF DAY. | Simulator enables driving in different simulated modes of day and Night. 0-24 hour timelines allows the instructor to change the time of day selection in real time. |
| 13 | ADVERSE WEATHER CONDITIONS | Simulator has the provision to drive / practice in adverse weather conditions and experience Rain, Fog & Dust from Low to High Intensity. |
| 14 | TRAINING MODULES | <p>The training modules are progressive & contain a large number of work scenarios. All aspects of loading, positioning, dumping, hauling are taught and continuously monitored. Tipper truck driver learns how to handle the vehicle from basic maneuvering to full operation in rough conditions.</p> <p>With the help of continuous evaluation, Instructors can identify inefficiencies or weaknesses so the operator can focus on training to correct or strengthen the areas. Repeating the exercises on the simulator before moving on to actual machine training ensures that the operator, job site personnel and the machine are protected from mishaps. Operators can make mistakes in a safe environment while training.</p> |

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| | | <p>The training modules include:</p> <ul style="list-style-type: none"> · MACHINE WALK AROUND · STARTING UP PROCEDURE: Basic start up procedure. · MARCHING FORWARD: How to move forward after starting the engine. · Marching REVERSE: How to move in reverse direction safely. · Stopping or Shut Down PROCEDURE: how to park a machine safely and securely. · Corridor Driving Forward: Driving with no load from wide corridor to narrow corridor with curves and followed by right angled turns. · Corridor Driving Reverse: Driving with no load condition from wide corridor and positioning. · DRIVING ON GRADIENTS: Learning to drive in load and no load conditions on up and down gradients. · DUMPING: Learn to position truck under full-load conditions for dumping at Dump site and Crusher site. · LOADING: Learn to position truck for loading, with truck body empty and in down position under shovel and at crusher site. · Driving the Circuit: Drive empty truck from dumping zone to loading, then wait until loading is complete. Truck must return to same dumping zone and dump load, completing one haul cycle. |
| 15 | TRAINING CUES | These are written and vocal messages of basic rules for habitual safe driving. Training language included in our proposal is English & Hindi. |
| 16 | EVALUATION & ASSESSMENT | The instructor operator station evaluates the trainees. Each training exercise is measured for detailed evaluation. The reports generated help the instructors identify the weakness of the trainee so that focused training can be provided. The performance reports provide a complete training and evaluation system. |

Lot 2: Loader Simulator & Softwares – 1 No.

| SL No | Technical Specification | Description |
|--------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HARDWARE SPECIFICATIONS | | |
| 1 | OPERATOR STATION – MOCKUP | <p>The operator station of the simulator consists of generic hardware controls as seen in a Dumper or Tipper. Vehicle instruments & controls including the seat are positioned ergonomically in correct locations & behave and operate as they do in the actual machine. It is a fully functional preconfigured simulator that contains all necessary Hardware and Software modules, visual system, visual database and a fully functional driving console with an active instrument panel to provide real life driving environment.</p> <p>Surround sound system provides a realistic representation of own machine in operation & the sound of other machines & virtual working environment in the scene.</p> |
| 2 | OPERATOR DISPLAY SCREEN | <p>* Display through: 180 Curved Screen Projection 80 Curved Screen Projection Display – 180 Degree Field of View: Curved Screen Display offers a world-class visual experience through its proprietary curved screens and seamless display systems. Curved screen with multiple channel projection systems provides a soft edge blending to create a continuous "Seamless Display". This not only offers high resolution, but also provides you a "More Realistic and Immersive Training".</p> |
| 3 | INTEGRATED MOTION (IN MOTION) SYSTEM | <p>3 DoF Motion Platform</p> <p>In-Motion 3 Degrees of Freedom is a state of the art electric motion platform providing accurate feedbacks required for realistic mine operations. These are sleek, portable and maintenance free. It eliminates the challenges of the bulky conventional systems.</p> <p>In-Motion platforms are programmed to provide all necessary sensations required for a realistic operation and training experience. These motion platforms provide realistic simulation feedback with senses of acceleration, braking, turning, jerks, gradients and soil interaction. They are upgradable and are designed to suit the entire range of Simulators.</p> |
| 4 | INSTRUCTOR OPERATOR STATION (IOS) | <p>The Instructor can control the training process. This station allows the instructor to create scenarios, record & playback the movements of the trainee/ operator for a better training. The instructor station is displayed on a Single 20" LED Screen. The Instructor station features are explained below.</p> |
| 5 | PROCESSING TYPE | High End Computer Systems |
| 6 | ELECTRIC SUPPLY | 220 – 240 volts |
| 7 | REALISTIC SOUND ENVIRONMENT | <p>Simulator gives high quality stereophonic representation of sound without clutter & captures following elements:</p> <ul style="list-style-type: none"> · Starting ignition sound · Vehicle engine sound · Surrounding traffic noise · Horn · Rain drops · Wind shield wiper |

| | | |
|-----------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <ul style="list-style-type: none"> · Screeching brake sound · Indicator's ticking sound |
| SOFTWARE SPECIFICATIONS (for 30 users) | | |
| 8 | EQUIPMENT TYPE | The software will be based on generic Loader. The 3D model and vehicle dynamics will replicate loader functionalities. Software with free license for unlimited users and free upgradations in future. |
| 9 | VIRTUAL ENVIRONMENT – GENERIC OPEN CAST MINE SITE | Loader Simulator is delivered with a highly realistic 3D simulated Generic mining site – Open cast with artificially intelligent automated equipment's such as haul trucks, excavators, wheeled loaders, dumpers, and light vehicles. The environment may be uniquely configured to address almost any training requirement. Realistic material interaction ensures realistic learning training to the operators. |
| 10 | SIMULATED MODES / TIME OF DAY | Simulator enables driving in different simulated modes of day and Night. 0-24 hour timelines allows the instructor to change the time of day selection in real time. |
| 13 | ADVERSE WEATHER CONDITIONS | Simulator has the provision to drive / practice in adverse weather conditions and experience Rain, Fog & Dust from Low to High Intensity. |
| 14 | TRAINING MODULES | <p>The training modules include:</p> <ol style="list-style-type: none"> 1. Controls Familiarization: Learn and understand operator controls 2. Starting up Procedure: How to start the Loader and precautions to be taken while starting the loader. 3. Maneuvering a loader: <ul style="list-style-type: none"> - Around the poles (slalom) - Driving on Gradients - Corridor Driving (wide and narrow) - Practicing Turns 4. Maneuvering a Dozer: <ol style="list-style-type: none"> a) On Gradients b) In Forward direction c) In Reverse direction 5. Bucket Positioning: Learning to position the loader bucket while traveling, while loading a truck, while stockpiling. 6. Stockpiling: Learn to use operator controls of Loader to fill bucket at digging zone, then dump contents of bucket in nearby dumping zone. 7. Loading Skills: How to load the material on a truck successfully. For advanced training artificially intelligent trucks arrive continuously and position themselves at random positions for loading. Thus the trainee operator is subjected to many different loading challenges. 8. End of Day parking/ Shutting down procedures: Learning to park the Loader at the end of day and following the safety operating standards for shutting down the engine. |
| 15 | TRAINING CUES | These are written and vocal messages of basic rules for habitual safe driving. Training language included in our proposal is English & Hindi. |
| 16 | EVALUATION & ASSESSMENT | The instructor operator station evaluates the trainees. Each training exercise is measured for detailed evaluation The reports generated help the instructors identify the weakness of the trainee so that focused training can be provided. The performance reports provide a complete training and evaluation system. |

Some of the assessment features are:

| |
|--------------------------------------------------------------|
| 1. Execution Time |
| 2. Collision With berm. |
| 3. Collision with Other Vehicle. |
| 4. Collision with Property. |
| 5. Collision with Human. |
| 6. Collision of loader Tyre with truck |
| 7. Collision of loader bucket with other vehicle or property |
| 8. Collision of loader boom with truck |
| 9. Speed Limit |
| 10. Off Route Driving |
| 11. Bucket Out Of Vision |
| 12. Machine Tilt |
| 13. Dumping Distance |
| 14. Parking Error |
| 15. Uneven Loading in truck. |
| 16. Loader cycle time: Duration |
| 17. Loader cycle time : Truck Loading |
| 18. Under Cutting |
| 19. Ideal starting Time error |
| 20. Ideal stopping time error |
| 21. Selecting directional gear when parking brake is applied |
| 22. Bucket Orientation error |
| 23. Maximum Bucket Height |
| 24. Positioning Error |
| 25. Productivity : Spillage |
| 26. Productivity : Waste Of Fuel |
| 27. Articulation Angle when entering digging Area |
| 28. Bucket Orientation Angle when entering Digging Area |
| 29. Time spent between digging and dumping area |
| 30. Bucket Above Truck cabin |

Section 2: Pre-qualification Criteria/ Minimum Eligibility for Bidder

This Request for Proposal (RFP) is invited from bidders meeting the following minimum pre-qualification/eligibility criteria.

| S. No. | Basic Requirement | Specific Requirements | Documents required |
|--------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Legal Entity | The Bidder must be a Registered Proprietorship firm/ A partnership firm registered under Indian Partnership Act, 1932/ A company registered under the Indian Companies Act, 1956 | <ul style="list-style-type: none"> • Copy of valid registration certificate shall be enclosed as a proof • Copy of Certificates of incorporation |
| 3 | Continuation of Business | The Bidder company should have been in existence as a registered company in India for at least 05 years | Incorporation certificate of the firm, registration certificate |
| 4 | OEM/Authorized Distributors | The bidder should be original manufacturer (OEM)/ OEM partners with authorization certificate from OEM | <p>For OEM: A self-certified certificate on the company's/ firm's letter head for OEM</p> <p>For Authorized Distributors: An authorization letter/certificate from the original equipment manufacturer (OEM)</p> |
| 5 | ISO Certificate | The bidder firm should have valid ISO certificate | Valid ISO certificate *Valid certificate mean the certificates should be valid on the date of opening of technical bid |
| 6 | Indian/International Standard | Product must be ISI / BIS / CE / US FDA / IEC etc. Indian/International Standards(valid ISI/BIS/CE /US FDA / IEC certificate) certified as applicable | .Valid ISI/BIS/CE /US FDA / IEC certificate as applicable |
| 7 | Financial Turnover | Minimum Average Annual Turnover of INR 10 crores for each of the three FY years of 2019-20, 2018-19 and 2017-18 | Audited financial statements/CA certified true copy stating the turnover |
| 8 | Bid Processing Fee & Bid Security Declaration | The bidders have to submit the Bid Security Declaration & the Bid Processing Fee as mentioned in "Important Dates & Schedule" | Proof of submission of Bid Security Declaration and Bid Processing Fee with Technical Bid |
| 9 | Authorized Service Centre | Presence of authorized service centre in Odisha (optional and not mandatory) | Proof to be submitted |
| 10 | Tax registration and clearance | The bidder should have a registered number of GST Income Tax / Pan number | Copies of relevant certificates of registration |

| S. No. | Basic Requirement | Specific Requirements | Documents required |
|--------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | Past Experience | <p>a) Should have proof of supply 50% of the required quantity (as mentioned in list of equipment) (executed directly by manufacturer or through distributor) of the equipment(s)/similar mining equipments mentioned in the list of equipment) to any Govt. organization/PSUs/Mining Industries /Universities/Research Institutes/private research laboratories / UN Agencies in India and purchase order copies in support of that in last 3 years</p> <p>b) The company must have executed a single work order of value not less than Rs 2 crores under mining sector within last 3 years</p> | Work orders, MoAs, letter of award, Work completion certificate and contract agreement copy etc. as proof |
| 12 | Global Presence | The bidder should have Global Presence at least in 10 countries. | <p>For OEM: A self-certified certificate on the company's/ firm's letter head for Global Presence</p> <p>For Authorized Distributors: An authorization letter/certificate from the original equipment manufacturer (OEM) for Global Presence</p> |
| 13 | Manufacturing Unit in India | The bidder must have at least 1(one) manufacturing unit in India. | <p>For OEM: A self-certified certificate on the company's/ firm's letter head for having manufacturing unit in India</p> <p>For Authorized Distributors: An authorization letter/certificate from the original equipment manufacturer (OEM) for having manufacturing unit in India</p> |
| 14 | Blacklisting | No bidder should have been blacklisted by any State Government or Central Government agencies or corporations governed by them. | Self-declaration in a notarized document |

Note: Exemption will be given to MSME firms for Average Annual Turnover, Past Experience and Global Presence as per the Finance Department guidelines of Government of India/Government of Odisha. Bidders need to submit MSME registration certificate as proof.

Section 3: Instructions to Bidder (ITB)

3.1 General Conditions

- a. All information supplied by bidders may be treated as contractually binding on the Bidders, on successful award of the assignment by DTE&T on the basis of this RFP.
- b. No commitment of any kind, contractual or otherwise shall exist unless and until a formal written contract has been executed between DTE&T and the selected bidder. Any notification of selected Bidder status by DTE&T shall not give rise to any enforceable rights by the Bidder. DTE&T may cancel the process at any time prior to a formal written contract being executed by DTE&T or post unsatisfactory of post-delivery inspection (PDI).
- c. This RFP supersedes and replaces any previous public documentation & communications done in this regard, and Bidders should place no reliance on such communications.

3.2 Compliance / Completeness of Response

- a. Bidders are advised to study all instructions, forms, terms, requirements, appendices and other information in the RFP documents carefully. Submission of the Proposal shall be deemed to have been done after careful study and examination of the RFP document with full understanding of its implications.
- b. Failure to comply with the requirements of this paragraph may render the Proposal non-compliant and the Proposal may be rejected. Bidders must:
 - a) Comply with all requirements as set out within this RFP.
 - b) Submit the forms as specified in this RFP and respond to each element in the order as set out in this RFP.
 - c) Include all supporting documentations specified in this RFP.
- c. The Proposals must be complete in all respects, Indexed and Hard Bound. The page numbers must be clearly marked on each page and cross reference be indicated on the Index Page.

3.3 Bidder Clarifications (Pre-Bid Discussion):

3.3.1 Queries to the RFP

- 3.3.1.1 DTE&T invites queries from Bidders on any section/ requirement mentioned in this RFP.
- 3.3.1.2 The Bidders will have to ensure that their queries should reach DTE&T, as per the communication address provided on or before the specified date for Pre-Bid Discussion.
- 3.3.1.3 The queries should either be sent to the specified e-mail or through authorized representative of the Bidder carrying an authorisation letter duly signed by competent authority of the company/ firm.
- 3.3.1.4 The queries should necessarily be submitted in the format given below, on or before 08th June'22/ Wednesday; 17:00 Hours IST

| Section/Page No. | Content of RFP requiring clarifications | Change/Clarification requested | Remarks |
|------------------|-----------------------------------------|--------------------------------|---------|
| | | | |
| | | | |
| | | | |

3.3.2 Responses to Queries and Issue of Corrigendum

- a.** The queries submitted by the Bidders will be responded through email or virtual meeting.
- b.** The purpose of Pre-Bid discussion is to provide the Bidders with information regarding the RFP, requirements, and opportunity to seek clarification regarding any aspect of the RFP. However, DTE&T, reserves the right to hold or to reschedule the Pre-Bid meeting.
- c.** DTE&T shall not be responsible for ensuring that the Bidder's queries have been received by them. Any requests for clarifications received after Pre-Bid meeting will not be entertained.
- d.** However, DTE&T makes no representation or warranty as to the completeness or accuracy of any response made in good faith, nor does it undertake to answer all the queries that have been submitted by the Bidders
- e.** DTE&T at any time prior to the last date for receipts of Proposals, may for any reason, modify the RFP Document by issuing a corrigendum.
- f.** The Corrigendum (if any) will be uploaded at DTE&T website <http://dtetodisha.gov.in/>.
- g.** Any such corrigendum shall be deemed to be incorporated into this RFP and binding on all Bidders.

3.4 Key Requirements of the Bid

3.4.1 Rights to terminate the process

- a.** DTE&T may terminate the RFP process at any time and without assigning any reason. DTE&T makes no commitments, express or implied, that this process will result in a business transaction with anyone.
- b.** This RFP does not constitute an offer by DTE&T. The Bidders' participation in this process may result in engaging the Bidder towards execution of the Contract.
- c.** Any document, information, data or statement submitted by the Bidder in its Proposals, based on which the selected Bidder was considered eligible or successful, is found to be false, incorrect or misleading.

3.4.2 Bid Processing Fee

Bidders must submit, along with their Proposals, non-refundable Bid Processing Fee of INR 10,000/- (Rupees Ten Thousand Only), in the form of a Demand Draft issued in favour of Directorate of Technical Education and Training, Odisha, payable at Cuttack.

3.4.3 Bid Security Declaration

Bidders shall submit Bid Security Declaration. It is mandatory to submit the "Bid Security declaration" form as mentioned in section 8 (Annexure-8), failing which the bid will be summarily rejected.

3.4.4 Submission of Responses

- a.** Pre-qualification Criteria, mandatory documents and Bid Processing Fee (in a separate sealed envelope)
- b.** Technical Proposal (in sealed envelope containing)
 - i.** Bid Security Declaration (in a separate sealed envelope)
 - ii.** Technical Proposal (in a separate sealed envelope)
- c.** Financial Proposal (in sealed envelope containing)
 - i.** Cover Letter
 - ii.** Financial Proposal

3.4.5 Authentication of Proposals

The Proposal should be authorized by the authorized signatory of the company. The Proposal shall be sent by Registered Post/Speed Post/Courier only. It is desirable but not mandatory that companies send their one representative during the opening of the bids.

3.5 Preparation and Submission of Proposal

3.5.1 Proposal Preparation Costs

The Bidder shall be responsible for all costs incurred in connection with participation of the RFP process, including, but not limited to, costs incurred in conduct of informative and other diligence activities, participation in meetings/ discussions/ presentations, preparation of Proposal, in providing any additional information required by to facilitate the evaluation process, and in negotiating a definitive Contract or all such activities related to the process.

DTE&T will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the process.

3.5.2 Language

The Proposal should be filled by the Bidders in English language only. If any supporting documents submitted are in any language other than English, translation of the same in English language is to be duly attested by the Bidders. For purposes of interpretation of the documents, the English translation shall govern.

3.5.3 Late Proposals

a. Original hard copy of the RFP document, tender fees and Bid Security Declaration received after the due date and the specified time (including the extended period if any) for any reason whatsoever, shall not be entertained and shall be returned unopened.

b. The Proposals submitted by telex/ telegram/ fax/ e-mail etc. shall not be considered. No correspondence will be entertained on this matter.

c. DTE&T shall not be responsible for any postal delay or non-receipt/ non-delivery of the documents. No further correspondence on the subject will be entertained.

d. DTE&T reserves the right to modify and amend any of the above-stipulated condition/ criterion depending upon project priorities vis-à-vis urgent commitments.

3.6 Evaluation Process

a. The DTE&T reserves the right to reject any or all Proposals on the basis of any deviations.

b. Each of the responses shall be evaluated as per the criteria and requirement specified in this RFP under the 'Evaluation and Selection' section.

3.6.1 Tender Opening

The Proposals submitted within due date and time mentioned in this RFP document will be opened by DTE&T, in the presence of the Bidders or their authorized representatives who may be present at the time of opening. The representatives of the Bidders should submit a letter of authorization from the Bidder companies to participate in the opening of the Proposal.

3.6.2 Proposal Validity

The offer submitted by the Bidders shall be valid for a minimum period of 180 days from the date of submission of Proposal.

3.6.3 Proposal Evaluation

Proposal evaluation and Selection will be carried out as per the specifications mentioned in the Section on 'Evaluation and Selection'.

3.7 Proposal Forms

Wherever a specific form is prescribed in this Request for Proposal (RFP) document, the Bidder shall use the form to provide relevant information. If the form does not provide space for any required information, space at the end of the form or additional sheets shall be used to convey the required information. For all other cases, the Bidder shall design a form to hold the required information. The additional sheets attached should be properly annexed.

In the event of documentary proof as required being not enclosed, the Bid shall be liable to be rejected. All pages of the bid, shall be signed by the authorized person or persons signing the bid along with the stamp of the bidder.

The documentary evidence regarding past performance shall be submitted along with the Bid shall be produced duly attested by the bidder on every page and serially numbered. Any interlineations, erasures or over writing shall be valid only if they are initialed by the person (s) signing the offer.

3.8 Local Conditions

a. Each Bidder is expected to become fully acquainted with the local conditions and factors, which may affect the performance of the Contract and/ or the cost.

b. The Bidder is expected to know all conditions and factors, which may have any effect on the execution of the Contract after issue of letter of Award. The DTE&T, shall not entertain any request for clarification from the Bidder regarding such local conditions.

c. It is the Bidder's responsibility that such factors have been properly investigated and considered before submitting the Proposal. No claim, whatsoever, including that for financial adjustment to the Contract awarded under the bidding document will be entertained by DTE&T. Neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the DTE&T on account of failure of the Bidder to know the local laws/ conditions. The Bidders may visit and examine and study the location of DTE&T and its surroundings and obtain all information that may be necessary for preparing the Proposal at its own interest and cost.

3.9 Contacting DTE&T or any of the bodies related to DTE&T

Any effort by the Bidder to influence the Proposal evaluation, Proposal comparison or Contract award decisions may result in the rejection of the Proposal.

Bidder shall not approach any DTE&T officer after office hours and/ or outside office premises, from the time of the Proposal opening till the time the Contract is awarded.

3.10 Tentative Schedule of Events

Tentative schedule of events shall be as per the dates and time given in the Important Dates & Schedule.

3.11 Opening of Proposal

First, Pre-Qualification of bidders will be checked. Secondly, the Technical cover will be opened and evaluated for the bidders who qualify in the Pre-Qualification Criteria. The Financial Proposal of the technically qualified bidders will only be opened. The Technical Evaluation Committee will open the Proposals. Sequence of opening is as follows:

- a. Pre-Qualification
- b. Technical Cover
- c. Financial Cover

3.12 Post-Delivery Inspection of equipment

DTE&T will conduct a post-delivery inspection of all equipment by its own technical experts or 3rd party agency/consultants/advisors appointed by DTE&T after the proposed equipment delivered by the selected bidder/bidders to the institute.

Bidders failing to comply with any of the clause then the Bid will be summarily rejected.

DTE&T reserves the rights to reject the bid any time without citing any reason thereof.

3.13 Deciding Award of Contract

a. DTE&T reserves the right to ask for a technical elaboration/clarification through email or verbally from the Bidder on the already submitted Technical Proposal at any point of time before opening the Financial Proposal.

b. DTE&T shall inform those Bidders whose Proposals did not meet the requirement or were considered non-responsive, informing that their Financial Proposals will be not opened after completing the selection process. DTE&T shall simultaneously notify those Bidders who technically qualify on the Technical Evaluation process, informing the date and time set for opening of Financial Proposals.

c. The Bidder's name, the Proposal Price, the total amount of each Proposal and other such details, will be announced and recorded by the DTE&T at the opening of Proposal.

d. After acceptance of LoA/WO, Performance Security has to be deposited as specified in this document for signing an Agreement with DTE&T.

e. Special Condition for Awarding the Agreement:

i. DTE&T will sign the Agreement with the successful Bidder for a period as mentioned in 'Duration of Contract' in the document.

ii. DTE&T may extend the Agreement for a time period beyond what has been specified in 'Duration of Contract' in the document.

iii. DTE&T will also have the right to provide extension/ increase in the scope of work as per the mutually agreed terms and conditions between both the parties.

f. In case of unsatisfactory or rejection of equipment or performance of L1 bidder, only L2 bidder will be invited for negotiation to supply and fulfill the contract at L1 prices

3.14 Confidentiality:

a. As used herein, the term "Confidential Information" means any information, including information created by or for the other party, whether written or oral, which relates to internal controls, computer or data processing programs, algorithms, electronic data processing applications, routines, subroutines, techniques or systems, or information concerning the business or financial affairs and methods of operation or proposed methods of operation, accounts, transactions, proposed transactions or security procedures of either party or any of its affiliates or any client of either party, except such information which is in the public domain at the time of its disclosure or thereafter enters the public domain other than as a result of a breach of duty on the part of the party receiving such information. It is the express intent of the parties that all the business process and methods used by the Bidder in rendering the Services hereunder are the Confidential Information of the Bidder.

b. The Bidders shall keep confidential, any information related to this RFP, with the same degree of care as it would treat its own confidential information. The Bidders shall note that the confidential information will be used only for the purposes of this RFP and shall not be disclosed to any third party for any reason whatsoever.

c. At all-time of the performance of the Services, the Bidder shall abide by all applicable security rules, policies, standards, guidelines and procedures. The Bidder should note that before any of its employees or assignees is given access to the Confidential Information, each such employee and assignees shall agree to be bound by the terms contained under this RFP and such rules, policies,

standards, guidelines and procedures by its employees or agents.

d. The obligations of confidentiality under this section shall survive rejection of the Contract.

3.15 Publicity

Any publicity by the Bidder containing the name of DTE&T should be done only with the explicit written permission from DTE&T.

3.16 Execution of the Agreement

After acknowledgement of the Letter of Award of Contract (LoA) or Work Order (WO) by the selected Bidder, a performance guarantee amounting to 3% of Total Bid Value has to be deposited in the form of FDR/TDR/DD/BG of any nationalized/scheduled bank drawn in the name of Directorate of Technical Education and Training, Odisha (DTE&T), Cuttack, the performance guarantee shall be valid for a period of 38 months from the date of award of Contract as specified in the RFP document. The selected Bidder shall sign the Agreement within thirty days from the issue of LoA/WO.

Agreement is mutually extendable post the completion of the initial term.

3.17 Performance Guarantee

The successful Bidder firm shall furnish the Performance Guarantee as stipulated in the section 'Contract Performance Guarantee' in this document.

3.18 Duration of Contract

The assignment of the work shall be valid initially for a period of **38 months**.

3.19 Terms and Conditions: Applicable Post Award of Contract

3.20 Termination Clause

3.20.1.1 Termination for Default

DTE&T may, without prejudice to any other remedy for breach of contract, by a written notice of default of at least 30 days sent to the selected Bidder, terminate the Contract in whole or in part (provided a cure period of not less than 30 days is given to the selected Bidder to rectify the breach):

3.20.1.1.1 If the selected Bidder fails to deliver any or all quantities of the equipment or services within the time period specified in the Contract, or any extension thereof granted by; or

3.20.1.1.2 If the selected Bidder fails to perform any other obligation under the Contract within the specified period of delivery of service or any extension granted thereof; or

3.20.1.1.3 If the selected Bidder, in the judgment of DTE&T, is found to be engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract.

3.20.1.1.4 If the selected Bidder commits breach of any condition of the Contract

If DTE&T terminates the Contract in whole or in part, the amount of Performance Guarantee shall be forfeited. Notwithstanding anything contrary elsewhere contained in the document, Bidder shall be entitled for all the payments accrued on account of services rendered till the date of such termination.

3.20.1.2 Termination for Insolvency

DTE&T, may at any time terminate the Contract by giving a written notice of at least 30 days to the selected Bidder, if the selected Bidder becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the selected Bidder, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to DTE&T.

3.20.1.3 Termination for Convenience

- a. DTE&T by a written notice of at least 30 days sent to the selected Bidder may terminate the Contract, in whole or in part, at any time for its convenience. The Notice of termination shall specify that termination is for DTE&T's convenience, the extent to which performance of the selected Bidder under the Contract is terminated, and the date upon which such termination becomes effective.
- b. In such cases, DTE&T will pay for the entire pending invoice as well as the work done till that date by the Bidder.
- c. Depending on merits of the case the selected Bidder may be appropriately compensated on mutually agreed terms for the loss incurred by the Contract if any, due to such termination.
- d. Limitation of Liability: In no event shall either party be liable for consequential, incidental, indirect, or punitive loss, damage or expenses (including lost profits). Notwithstanding anything to contrary elsewhere mentioned in the contract, the selected Bidder shall not be liable to the other here under or in relation here to for more than the value of the fees to be paid (including any amounts invoiced but not yet paid) under this Agreement.

3.20.1.4 Termination by DTE&T

- a. The DTE&T may, by not less than 30 days written notice of termination to the Bidder, such notice to be given after the occurrence of any of the events, terminate this Agreement if:

- i. The selected Bidder fails to remedy any breach hereof or any failure in the performance of its obligations here under as specified in a notice of suspension, within thirty (30) days of receipt of such notice of suspension or within such further period as the may have subsequently granted in writing;

- ii. The selected Bidder becomes insolvent or bankrupt or enters into any agreement with its creditors for relief of debt or take advantage of any law for the benefit of debtors or goes into liquidation or receivership whether compulsory or voluntary;

- iii. The selected Bidder fails to comply with any final decision reached as a result of the Dispute Resolution mechanism/proceedings.

- iv. The selected Bidder submits to the DTE&T a statement which has a material effect on the rights, obligations or interests of DTE&T and which the selected Bidder knows to be false.

- b. Any document, information, data or statement submitted by the Bidder in its Proposals, based on which the selected Bidder was considered eligible or successful, is found to be false, incorrect or misleading; or as the result of Force Majeure, the selected Bidder is unable to perform a material portion of the Services for a period of not less than sixty (30) days

- c. If the DTE&T would like to terminate the Contract for reasons not attributable to the selected Bidder's performance, they will need to clear all invoices for the Services up to the date of the notice. If the DTE&T would like to terminate the Contract for reasons attributable related to the selected Bidder's performance, the DTE&T will give a rectification notice for 1 month to the Bidder in writing with specific observations and instructions.

3.20.1.5 Consequences of Termination

- a. In the event of termination of the Contract due to any cause whatsoever, [whether consequent to the stipulated term of the Contract or otherwise], DTE&T shall be entitled to impose any such obligations and conditions and issue any clarifications as may be necessary to ensure an efficient transition and effective business continuity of the Service(s) which the Bidder shall be obliged to comply with and take all available steps to minimize loss resulting from that termination/breach, and further allow the next successor Bidder to take over the obligations of the rest while Bidder in relation into the execution/continued execution of the scope of the Contract.

b. Nothing herein shall restrict the right of DTE&T to invoke guarantees, securities furnished, enforce the Deed of Indemnity and pursue such other rights and/or remedies that may be available to the under law or otherwise.

c. The termination here of shall not affect any accrued right or liability of either Party nor affect the operation of the provisions of the Contract that are expressly or by implication intended to come into or continue in force on or after such termination.

3.20.1.6 Delay Charges

a. Notwithstanding the right of DTE&T to cancel the order, Delay Charges for late delivery of deliverables at 1% (One percent) of the undelivered portion of order value per week will be charged for every week's delay in the specified delivery schedule under "Deliverables and Payment Schedule" in this RFP subject to a maximum of 10% of the value of the contract. Delay Charges should be recouped from Performance Guarantee. No Damage will be charged in case of circumstances beyond control of the Company.

b. Please note that the above Delay Charges for delay in delivery and delay in commissioning are independent of each other and shall be levied as the case maybe.

c. DTE&T reserve its right to recover these amounts from Performance Guarantee. Delay Charges will be calculated on per week basis.

d. The cumulative and aggregate limit of Delay Charges for delay in delivery and Delay Charges for delay in commissioning would be limited to maximum of 10% of the total Bid Value. The aggregate liability of the Company shall in no event exceed the total value of the fee received under this Contract.

3.20.1.7 Dispute Resolution Mechanism

a. The DTE&T and the selected Bidder shall make every effort to resolve amicably by direct negotiations, any disagreement or dispute, arising between them under supply order.

b. All claims and disputes arising under or relating to this Agreement are to be settled by binding arbitration in the state of Odisha. An award of arbitration may be confirmed in a court of competent jurisdiction. Arbitration shall be as per Indian Arbitration Act, 1996.

c. The DTE&T may terminate this contract, by giving a written notice of termination of minimum 30 days, to the selected Bidder, if the selected Bidder fails to comply with any decision delivered by DTE&T.

3.20.1.8 Notices

Notice or other communications given or required to be given under the Contract shall be in writing and shall be e-mailed followed by hand-delivery with acknowledgement thereof, or transmitted by prepaid registered post or courier. Any notice or other communication shall be deemed to have been validly given on date of delivery if hand delivered & if sent by registered post than on expiry of seven days from the date of posting.

3.20.1.9 Force Majeure

Force Majeure is herein defined as any cause, which is beyond the control of the selected Bidder or DTE&T as the case may be which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the Contract, such as:

a. Natural phenomenon, including but not limited to floods, droughts, earthquakes and epidemics/pandemic.

b. Acts of any government, including but not limited to war, declared or undeclared priorities, quarantines and embargo.

c. Terrorist attack, public unrest in work area provided either party shall within 10 days from occurrence of such a cause, notifies the other in writing of such causes.

The selected Bidder or DTE&T shall not be liable for delay in performing his/her obligations resulting from any force majeure cause as referred to and/ or defined above.

Force Majeure shall not include any events caused due to acts/ omissions of such Party or result from a breach/contravention of any of the terms of the Contract, Proposal and/or the Request for Proposal (RFP). It shall also not include any default on the part of a party due to its negligence or failure to implement the stipulated/proposed precautions, as were required to be taken under the Contract. The failure or occurrence of a delay in performance of any of the obligations of either party shall constitute a Force Majeure event only where such failure or delay could not have reasonably been foreseen, or where despite the presence of adequate and stipulated safeguards the failure to perform obligations has occurred. In such an event, the affected party shall inform the other party in writing within five days of the occurrence of such event. The DTE&T will make the payments due for Services rendered till the occurrence of Force Majeure. However, any failure or lapse on the part of the Selected Bidder in performing any obligation as is necessary and proper, to negate the damage due to projected force majeure events or to mitigate the damage that may be caused due to the above mentioned events or the failure to provide adequate disaster management/ recovery or any failure in setting up a contingency mechanism would not constitute force majeure, as set out above.

In case of a Force Majeure, all Parties will endeavor to agree on an alternate mode of performance in order to ensure the continuity of Service and implementation of the obligations of a party under the Contract and to minimize any adverse consequences of Force Majeure.

In case, Force Majeure hinders the validity, performance guarantee and project duration should be extended accordingly as desired by Govt.

3.20.1.10 Failure to agree with Terms and Conditions of the RFP

Failure of the successful Bidder to agree with the Terms & Conditions of the RFP shall constitute sufficient grounds for the annulment of the award, in which event may invoke the PBG of the successful Bidder and award the contract to the next best value Bidder or call for new Proposals from the interested Bidders.

3.21 Contract Performance Guarantee

a. Within 21 days after the receipt of notification of award of the Contract/Letter of Intent from, the successful Bidder shall furnish Contract Performance Guarantee to the DTE&T which shall be equal to 3% of Total Bid Value and shall be in the form of a Bank Guarantee Bond from any Nationalized Bank/ Scheduled bank in the Performa given here-in-after in this document valid for period of 38 months from the date of award of Contract as specified in the document.

b. The proceeds of the performance guarantees shall be payable to the DTE&T as compensation for any loss/ penalties resulting from the Selected Bidders failure to complete its obligations under the Contract.

c. The performance guarantee will be released by DTE&T and returned to the Selected Bidder after 38 months from the date of award of Contract as specified in the document.

3.22 Statutory Requirements

During the tenure of this Contract, nothing shall be done by the Selected Bidder in contravention of any law, act and/ or rules/ regulations, there under or any amendment thereof governing inter-alia customs, stowaways, foreign exchange etc. and shall keep indemnified in this regard.

3.23 Contract administration

a. Either party may appoint any individual/Company as its authorized representative through a written notice to the other party. Each Representative shall have the authority to:

i. Exercise all of the powers and functions of his/ her Party under this Contract, other than

RFP for supply of equipment, installation, commissioning and maintenance at ITI Koira

the power to amend this Contract and ensure proper administration and performance of the terms hereof; and

ii. Bind his or her Party in relation to any matter arising out of or in connection with this Contract.

iii. The Selected Bidder shall be bound by all undertakings and representations made by the authorized representative of the Selected Bidder and any covenants stipulated hereunder, with respect to this Contract, for and on their behalf.

iv. For the purpose of execution or performance of the obligations under this Contract, the DTE&T's representative would act as an interface with the nominated representative of the Selected Bidder. The Selected Bidder shall comply with any instructions that are given by the representative during the course of this Contract in relation to the performance of its obligations under the terms of the Contract.

v. A committee comprising of representatives from the DTE&T and the Selected Bidder shall meet on a quarterly basis to discuss any issues/ bottlenecks being encountered. The Selected Bidder shall draw the minutes of these meetings and circulate to the DTE&T.

3.24 Right of Monitoring, Inspection and Periodic Audit

The DTE&T reserves the right to inspect and monitor/ assess the progress/ performance at any time during the course of the Contract, after providing due notice to the Selected Bidder. DTE&T may demand, and upon such demand being made, the selected Bidder shall provide with any document, data, material or any other information required to assess the progress of the project. DTE&T shall also have the right to conduct, either itself or through any another consultant/ advisor as it may deem fit, an audit to monitor the performance by the Selected Bidder of its obligations/ functions in accordance with the standards committed to or required by DTE&T and the Selected Bidder undertakes to cooperate with and provide to DTE&T / any other Consultant/ Advisor/ Company appointed by DTE&T, all documents and other details as may be required by them for this purpose. Any deviations or contravention identified as a result of such audit/ assessment would need to be rectified by the Selected Bidder failing which DTE&T may, without prejudice to any other rights that it may have, issue a notice of default.

3.25 DTE&T's Obligations

DTE&T shall interface with the Selected Bidder, to provide the required information, clarifications, and to resolve any issues as may arise during the execution of the Contract.

DTE&T shall ensure that timely approval is provided to the selected Bidder, where deemed necessary, as part of the Scope of Work.

3.26 Indemnity

The Selected Bidders shall execute and furnish a Deed of Indemnity in favor of the DTE&T, in a form and manner acceptable to the, indemnifying from and against any costs, loss, damages, expense, claims including those from third parties or liabilities of any kind how- so-ever suffered including patent, copyright, trademark and trade secret, arising or incurred inter-alia during and after the Contract period out of:

a. Negligence or wrongful act or omission by the Selected Bidder or its team or any Company/ Third Party in connection with or incidental to this Contract; or

b. Any breach of any of the terms the Selected Bidder's Proposal as agreed, the Tender and this Contract by the Selected Bidder, its Team or any Company/ Third Party.

c. The indemnity shall be to the extent of Total Bid Value.

3.27 Bid Prices

Bid Price should have equipment wise breakup and including Freight, GST and any other taxes & duties. Bid price should be valid for minimum 180 days from the last date of submission of Proposals. A bid valid for a shorter period shall be rejected by DTE&T.

Prices quoted must be firm and shall not be subject to any upward revision on any account whatsoever throughout the period of the engagement. An offer submitted in vague/ambiguous financial terms and the like, shall be termed as non-responsive and shall be summarily rejected.

3.28 Payment Schedule

Payment will be made to the selected company as per the schedule mentioned in section 9. "Deliverable and Payment Schedule"

3.29 Continuance of the Contract:

Notwithstanding the fact that settlement of dispute(s) (if any) may be pending, the parties hereto shall continue to be governed by and perform the work in accordance with the provisions under the Scope of Work to ensure continuity of operations.

3.30 Conflict of interest

The Bidder shall disclose to DTE&T in writing, all actual and potential conflicts of interest that exist, arise or may arise in the course of performing the Service(s) as soon as practical after it becomes aware of that conflict.

3.31 Severance

In the event any provision of the Contract is held to be invalid or unenforceable under the applicable law, the remaining provisions of this Contract shall remain in full force and effect.

3.32 Governing Language

The Agreement shall be written in English language. Subject to below Clause, such language versions of the Agreement shall govern its interpretation. All correspondence and other documents pertaining to the Contract that are exchanged by parties shall be written in English language only.

3.33 "No Claim "Certificate

The Selected Bidder shall not be entitled to make any claim, whatsoever against, under or by virtue of or arising out of, the Contract, nor shall entertain or consider any such claim, if made by the Selected Bidder after it has signed a "No claim" certificate in favor of DTE&T in such form as shall be required by it after the work is finally accepted.

3.34 Publicity

The Selected Bidder shall not make or permit be made a public announcement or media release about any aspect of this Contract unless DTE&T first gives its written consent to the selected Bidder.

3.35 General

3.35.1 Relationship between the Parties

Nothing in the Contract constitutes any fiduciary relationship between the DTE&T, and Selected Bidder/Bidder's Team or any relationship of employer/employee, principal and agent, or partnership, between DTE&T and Selected Bidder.

No Party has any authority to bind the other Party in any manner whatsoever except as agreed under the terms of the Contract.

DTE&T will not be under any obligation to the Implementing Company's Team except as agreed

under the terms of the Contract.

3.35.2 No Assignment

The Selected Bidder shall not transfer any interest, right, benefit or obligation under the Contract without the prior written consent of the DTE&T.

3.35.3 Survival

The provisions of the clauses of the Contract in relation to documents, data, processes, property, Intellectual Property Rights, indemnity, publicity and confidentiality and ownership survive the expiry or termination of this Contract and in relation to confidentiality, the obligations continue to apply unless notifies the Selected Bidder of its release from those obligations.

3.35.4 Entire Contract

The terms and conditions laid down in the Request for Proposal (RFP) and all annexure thereto as also the Proposal and any attachments/ annexes thereto shall be read in consonance with and form an integral part of the Contract. The Contract supersedes any prior contract, understanding or representation of the Parties on the subject matter.

3.35.5 Governing Law

This Contract shall be governed in accordance with the laws of India.

3.35.6 Jurisdiction of Courts

The High Court of Odisha at Cuttack, has exclusive jurisdiction to determine any proceeding in relation to the Contract.

3.35.7 Compliance with Laws

The Selected Bidder shall comply with the laws in force in India in the course of performing the Contract.

3.35.8 Notices

A “notice” means:

- i. A Notice; or
- ii. A consent, approval or other communication required to be in writing under the Contract.

All notices, requests or consent provided for or permitted to be given under this Contract shall be in writing and shall be deemed effectively given when personally delivered or mailed by prepaid certified/registered mail, return receipt requested, addressed as follows and shall be deemed received within two days after mailing or on the date of delivery if personally delivered:

To, **Director,**

Directorate of Technical Education and Training, Odisha

Killa Maidan, Buxi Bazaar,

Cuttack, Odisha-753001

Phone No : 0671-2301061

Email : dtetorissa@gmail.com & dtetodisha.procurement@gmail.com

Any Party may change the address to which notices are to be directed, by giving a notice to the other party in the manner specified above. A notice served on a Representative is taken to be notice to that Representative's Party.

3.35.9 Waiver

Any waiver of any provision of this Contract is ineffective unless it is in writing and signed by the Party waiving its rights.

A waiver by either Party in respect of a breach of a provision of this Contract by the other Party is not a waiver in respect of any other breach of that or any other provision.

The failure of either Party to enforce at any time any of the provisions of this Contract shall not be interpreted as a waiver of such provision.

3.35.10 Modification

Any modification of the Contract shall be in writing and signed by an authorized representative of each Party.

3.35.11 Taxes

The Bidder shall pay service and other applicable taxes, if any, imposed on the Services under this Contract. Any variation to statutory duties/taxes shall be borne by DTE&T.

3.35.12 Application

These General Conditions shall apply to the extent that provisions in other parts of the Contract do not supersede them.

3.36 Fraud and Corrupt Practices

3.36.1 Fraud and Corrupt Practices

a. The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this RFP, DTE&T shall reject a Proposal without being liable in any manner whatsoever to the Bidder, if it determines that the Bidder has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the “Prohibited Practices”) in the Selection Process. In such an event, DTE&T shall, without prejudice to its any other rights or remedies, appropriate the Bid Security or Performance Security, as the case maybe, as mutually agreed genuine pre-estimated compensation and damages payable to DTE&T for, inter alia, time, cost and effort of DTE&T, in regard to the RFP, including consideration and evaluation of such Bidder’s Proposal.

b. Without prejudice to the rights of DTE&T under Clause above and the rights and remedies which DTE&T may have under the LoA/WO or the Agreement, if an Bidder, is found by DTE&T to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the LoA/WO or the execution of the Agreement, such Bidder shall not be eligible to participate in any tender or RFP issued by DTE&T during a period of 2(two) years.

c. For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:

i. “corrupt practice” means the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process.

ii. “Fraudulent practice” means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process.

iii. “Coercive practice” means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person’s participation or action in the Selection Process.

iv. “undesirable practice” means (i) establishing contact with any person connected with or employed or engaged by with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or(ii) having a Conflict of Interest; and

v. “Restrictive practice” means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Selection Process.

Section 4: Deliverables and Payment Schedule:

The selected company will have the following deliverables and payment milestones:

| Payment Milestone | Deliverables | Timeline for completion of deliverables | Amount Payable |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Milestone 1 | <p>i) Delivery of the equipment, and machineries as per the minimum specifications and list mentioned in Section 1.</p> <p>ii) Post-Delivery inspection and satisfactory reports from the technical experts appointed by DTE&T</p> | <p>i) Within 60 days from signing the Contract Agreement for Packages (A, B, C & D)</p> <p>ii) Within 120 days from signing the Contract Agreement for Package E</p> | <p>60% of the total Bid Value with applicable GST for will be paid within 30 days of</p> <ol style="list-style-type: none"> 1. Receipt of the all equipment/ materials/machineries at Govt. ITI Koira and stock entry by the Principal of the institute 2. Completion of post-delivery inspection with satisfactory reports |
| Milestone 2 | <p>a) Completion of Installation, Commissioning and testing</p> <p>b) Handholding training to the technical officers/training officers/staffs of the institute on operating the equipment</p> | <p>i) Installation and Commissioning within 15 days of from the delivery of equipment/machines at Govt. ITI Koira</p> <p>ii) Hand-holding for 7 days after installation and commissioning</p> | <p>25% of the total Bid Value with applicable GST for within 30 days' after</p> <ol style="list-style-type: none"> 3. Successful installation, commissioning & testing of all the equipment 4. Handholding training to the staffs of institute |
| Milestone 3 | Satisfactory maintenance and calibration after installation and commissioning | Yearly performance and Maintenance after installation and commissioning | <p>15% of the Bid Value in equal Installment for 3 years.</p> <p>(5% of the Bid Value with applicable GST within 30 days after each year of satisfactory maintenance and calibration done and certificate to this effect by the Principal of Govt. ITI Koira)</p> |
| Milestone 4 | a) Annual Maintenance Contract (AMC) for 3 (three) years after the warranty period | Yearly basis as the rate quoted by the selected bidder for AMC per year | <p>Within 30 days of invoice submission</p> <p>Note: The payment of AMC will be made once in a year basis after satisfactory completion of said period by the DTE&T</p> |

Note: No Advanced Payment will be given to the selected bidder. Each schedule of payment will be done after due inspection and satisfactory reports initiated by DTE&T.

Section 5: Documents/Details to be submitted with Technical Proposal

The technical bid shall be submitted with documents specified below with annexures

| SL.No | Document Description |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Bid processing Fee |
| 2 | Bid Security Declaration - Annexure 8 |
| 3 | Tech Form I – Proposal Submission Letter |
| 4 | Tech Form II – Bidder’s Profile |
| 5 | Tech Form III – Bidder’s Experience |
| 6 | Copies of purchase orders & end user certificates in support of the information furnished in Tech Form III |
| 7 | Fin Form I – Financial Form Format |
| 8 | Self-declaration in case the bidder is an OEM as per Annexure - 1 |
| i. | Authorization letter (Manufacturer’s authorization letter – in case the bidder is the authorized distributor of OEM) as per Annexure - 2 |
| ii. | Annual Average Turnover Statement by Chartered Accountant as per Annexure - 3 |
| 9 | Copies of the annual audited statement / Annual Report for 2017-18, 2018-19, 2019-20 (Provisional statement of account shall not be considered) |
| i. | In case of distributor, Annual average turnover statement & annual audited statement / Annual report for both the distributor as well as the manufacturer (OEM) |
| 10 | Statement of deviation – Technical Specification as per Annexure - 4 |
| 11 | Para-wise compliance to Technical Specification as per Annexure - 5 |
| i. | Copy of the Leaflets / Technical Brochures of the Model offered in support of the information provided in Format – Annexure 5 |
| ii. | Copy of Quality Certificates (valid ISI / BIS / CE / US FDA / IEC etc. & ISO) of the product / organization (As per Section 1 - Technical Specification). |
| 12 | Copy of the GST registration certificate and Copy of PAN |
| 13 | An affidavit for not being blacklisted as per Annexure-6 |
| 14 | Power of Attorney as per Annexure - 7 |
| 15 | Bid Security Declaration as per Annexure - 8 |
| 16 | Bank Guarantee Format for Performance Security as per Annexure - 9 |
| 17 | Acceptance of Terms & Conditions contained in the RFP Document as per Annexure - 10 |
| 18 | Declaration of correctness and authenticity of information provided in the Full Technical Proposal as per Annexure - 11 |
| 19 | Proposal Submission Compliance Check List as per Annexure - 12 |
| 20 | Self-Declaration regarding “Restrictions on procurement from a Bidder of a country which shares a land border with India” as per Annexure-13 |
| 21 | Self-Declaration regarding “Global Presence”. <u>For OEM:</u> A self-certified certificate on the company’s/ firm’s letter head for Global Presence <u>For Authorized Distributors:</u> An authorization letter/certificate from the original equipment manufacturer (OEM) for Global Presence |

Section 6: Evaluation and Selection of bidder

6.1 Technical Evaluation

Initial Bid scrutiny will be made and incomplete details as given below will be treated as non- responsive if Proposals

- i. Are not submitted in as specified in the RFP document
- ii. Are found with suppression of details
- iii. With incomplete information, subjective, conditional offers and partial offers submitted
- iv. Have non-compliance of any of the clauses stipulated in the RFP
- v. Have a lesser validity period

All responsive Bids will be considered for further processing as below.

Technical Evaluation Committee will prepare a list of responsive Bidders, who comply with all the Terms and Conditions of the RFP. All eligible bids will be considered for further evaluation by the Committee according to the evaluation process defined in this RFP document. The decision of the Committee will be final & binding in this regard.

- a. Technical Evaluation committee will examine the bids to determine whether they are complete, whether any computational errors have been made, and whether the bids are generally in order.
- b. DTE&T may conduct clarification meetings with each or any Bidder to discuss any matters, technical or otherwise.
- c. Further the scope of evaluation committee also covers taking any decision with regard to the RFP document, execution/ implementation of the work including AMC period.
- d. Proposal document shall be evaluated as per the following steps.
 - i. Evaluation of document: A detailed evaluation of the bids shall be carried out by the Technical Evaluation Committee in order to determine whether the Bidders are competent enough and whether the technical aspects are substantially responsive to the requirements set forth in the RFP document. The bidders must submit the Make, Model, Features, and Technical Specifications along with the images of equipment for which they are submitting the bid.
 - ii. Bidders may propose better technical specifications which may fit for the Mining Skill Academy and fulfill the objective of the project.
 - iii. Bidders failing to comply with any of the above then the Bid will be summarily rejected.
 - iv. The Bidders are required to submit all required documentation in support of the evaluation criteria specified (e.g. Detailed Project citations and copy of work order, clients contact information for verification, and all others components) as required for technical evaluation.
 - v. DTE&T reserves the right to do a reference check of the past experience stated by the Bidder. Any feedback received during the reference check shall be taken into account during the technical evaluation process.
 - vi. DTE&T reserves the right to accept or reject any or all bids without giving any reasons thereof.
 - vii. Bidders who scores at least 70% marks in Technical Evaluation criteria set forth in this RFP document will be eligible for opening of their Financial Bid. If a bid does not meet

these minimum score, it will be deemed technically non-compliant and will not proceed to the financial evaluation.

Technical Bid Score is calculated as follows: -

ST = Technical score X 70/ 100

vii. DTE&T shall inform to the technically shortlisted Bidders about the date and venue of the opening of the financial proposals.

Technical Evaluation Matrix

| Sl. No. | Evaluation Criteria | Maximum marks | Remarks |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------|
| 1. | Average Annual Turnover <ul style="list-style-type: none"> • 50 to 100 Crore – 05 Marks • More than 100 Crore – 10 Marks | 10 | |
| 2. | Global Presence <ul style="list-style-type: none"> • 10 to 20 Countries – 05 Marks • More than 20 Crore – 10 Marks | 10 | |
| 3. | Past Experience (Executed a single work order of value Rs 2 crores or more under mining sector within last 3 years) <ul style="list-style-type: none"> • 2 Crore to 5 Crore – 05 Marks • More than 5 Crore – 10 Marks | 10 | |
| 4. | Quality of equipment/machines, simulators and softwares <ul style="list-style-type: none"> • Minimum specifications as per Section – 1B <p><u>70 Marks for the quality of equipment for which the Bidder submitted it's proposal</u></p> <p>Marks will be given proportionately for the number of equipment/machines from a Lot/Lots of a Package/Packages for which the Bidder submits it's proposal.</p> | 70 | |

**Note: - 1- The bidder has to score at least 70% to qualify for the opening of Financial Bid.
2- The scores provided by the Technical Committee, will be considered as final.**

6.2 Financial Evaluation

The Bidder shall be selected on the basis of Quality cum Cost Based System (QCBS).

All the technically qualified bidders will be notified to participate in Financial Proposal opening process.

Financial Proposals for the technically qualified bidders will then be opened on the notified date and time and reviewed to determine whether the financial proposals are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at DTE&T's discretion.

Financial Proposals that are not meeting the condition mentioned in Fin Form-I shall be liable for rejection.

If there is a discrepancy between words and figures, the amount in words shall prevail. For any other calculation/ summation error etc. the bid may be rejected.

Financial Proposals of only those bidders who qualify in the Technical Proposal evaluation shall be opened and computed based on the commercial bid submitted by the bidders. If

FDC is the value of commercial bid price quoted in the bid under consideration.

FLDC is the value of lowest commercial Bid among all the technically qualified bidders.

Commercial Bid Score (SF) for each bid shall be computed as follows:

$$\mathbf{SF = 30 \times (FLDC / FDC)}$$

TOTAL SCORE

Total Score (Ts) for each qualified bid shall be computed as under:

$$\mathbf{TS = ST + SF}$$

The Bidder obtaining highest Total Score (TS) value, will be declared as the **Best Evaluated Bid and Selected Bidder**.

Section 7: Technical and Financial Proposal Standard Forms

<< Declaration to be submitted under the signature of Authorized Representative / Signatory of the applicant agency on Official Letterhead and official seal >>

Tech Form I: Format for Proposal Submission Letter

Dated _____

To,

The Director
DTE&T, Cuttack

Subject: RFP for Supply, installation, commissioning, and maintenance of equipment at Govt. ITI Koira

Dear Sir,

We <Name of the Bidder>..... hereby submit our Technical proposal along with financial proposal in response to notice inviting RFP dateand RFP document no.....and confirm that:

1. I/we, having examined the RFP Document and understood the content, hereby submit my/our Bid. The Bid is unconditional and unqualified.
2. I/ We acknowledge that the DTE&T will be relying on the information provided in the Bid and the documents accompanying the Bid for selection of the Bidder for the aforesaid project, and we certify that all information provided therein is true and correct; nothing has been omitted which renders such information misleading; and all documents accompanying the Bid are true copies of their respective originals.
3. This statement is made for the express purpose of qualifying as a Bidder for the aforesaid project.
4. I/ We shall make available to the DTE&T any additional information it may find necessary or require to supplement or authenticate the Bid.
5. I/ We acknowledge the right of the DTE&T to reject our Bid without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, our right to challenge the same on any account whatsoever.
6. I/ We certify that in the last three years (FY 2019-20, FY 2018-19 and FY 2017-18,), we have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award, nor been expelled from any project or contract by any public authority nor have had any contract terminated by any public authority for breach on our part.
7. I/ We declare that:
 - a) I/ We have examined and have no reservations to the RFP Document, including any Addendum issued by the Authority (DTE&T);
 - b) I/ We do not have any Conflict of Interest in accordance with Section 3, Clause 3.29 of the RFP document;
 - c) I/We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in the RFP document, in respect of any tender or request for proposal issued by or any agreement entered into with the DTE&T or any other public sector enterprise or any government, Central or State; and

- d) I/ We hereby certify that we have taken steps to ensure that in conformity with the provisions of Section 3 Clause 3.35 of the RFP, no person acting for us or on our behalf has engaged or will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.
8. I/ We understand that the Authority may cancel the Bidding Process at any time and that the Authority is neither bound to accept any Bid that you may receive nor to invite the Bidders to Bid for the Project, without incurring any liability to the Bidders.
9. I/ We agree and undertake to abide by all the terms and conditions of the RFP document.
10. I/ We offer a Bid Security Declaration to the Authority in accordance with the RFP Document.
11. The Bid Security Declaration in the prescribed format has been submitted.
12. I/ We agree and understand that the Bid is subject to the provisions of the Bidding Documents. In no case, I/we shall have any claim or right of whatsoever nature if the Project is not awarded to me/us or our Bid is not opened or rejected.
13. I/ We certified that the period of validity of Proposal is 180 days from the last date of submission of Proposal and I/We are quoting for all the services mentioned in the Scope of Work of the RFP.
14. DTE&T, may contact the following person for further information regarding this Proposal:
Name Designation Contact No Email ID Company Name
Full address of office

In witness thereof, I/we submit this Bid under and in accordance with the terms of the RFP document

With Regards,

Signature and Seal

Full name of signatory Designation: Name of the Bidder/Company etc.

Name and seal of the Bidder Date:

Place:

Tech Form II: Format for Bidder's Profile

<< Declaration to be submitted under the signature of Authorized Representative / Signatory of the applicant agency on Official Letterhead and official seal >>

| S No. | GENERAL INFORMATION ABOUT THE BIDDER | | | | | |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------|--|------------------------------------------------|----------|
| 1 | Name of the Bidder | | | | | |
| | Registered address of the firm | | | | | |
| | State | | District | | | |
| | Telephone No. | | Fax | | | |
| | Email | | Website | | | |
| Contact Person Details | | | | | | |
| 2 | Name | | Designation | | | |
| | Telephone No. | | Mobile No. | | | |
| Communication Address | | | | | | |
| 3 | Address | | | | | |
| | State | | District | | | |
| | Telephone No. | | Fax | | | |
| | Email | | Website | | | |
| Type of the Firm (Please tick <input type="checkbox"/> relevant box) | | | | | | |
| 4 | Private Ltd | | Public Ltd. | | Proprietorship | |
| | Partnership | | Society | | Others, specify | |
| | Registration No. & Date of Registration. | | | | | |
| Type of the Firm (Please tick <input type="checkbox"/> relevant box) | | | | | | |
| 5 | Original Equipment Manufacturer (OEM) | | Authorized Distributor | | | |
| Key personnel Details (Chairman, CEO, Directors, Managing Partners etc.) | | | | | | |
| 6 | in case of Directors, DIN Nos. are required | | | | | |
| | Name | | Designation | | | |
| | Name | | Designation | | | |
| 7 | Whether any criminal case was registered against the company or any of its promoters in the past? | | | | | Yes / No |
| 8 | Other relevant Informations | | | | | |
| 8a. | VAT/CST/GST Registration : Furnish the copy of the VAT/CST/GST registration certificate | | | | | |
| 8b. | PAN : Furnish the copy of the PAN | | | | | |
| 9 | Details of existing Service Center in Odisha/India: Name of Contact Person: Designation: Address of Service Center: Telephone No.: Email: Fax: | | | | | |
| 10 | Date: | | Office Seal | | Signature of the bidder / Authorised signatory | |

Note:

1. *All correspondence shall be to the aforesaid email ids only.*
2. *DTE&T shall entertain communications received from the aforesaid email IDs only.*
3. *DTE&T shall not be liable if the Single point of Contact fails to convey relevant information to their organization /Authorities*
4. *DTE&T shall not entertain requests from the organization /Authorities to re send Emails.*

Tech From III: Bidder's Experience

| S. No | Name of Client, Contact Person, Telephone No, Mobile No, e-mail, Address | Name of Project/ Location | Project Start Date,End Date, Brief of Project | Project Cost | Status (Complete/ In Progress/ Delay) |
|--------------|---------------------------------------------------------------------------------|----------------------------------|------------------------------------------------------|---------------------|----------------------------------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Fin Form I: Financial Proposal Format

Dated _____

To,

The Director
DTE&T, Cuttack

Subject: RFP for Supply, installation, commissioning, and maintenance of equipment at Govt. ITI Koira

Dear Sir,

We, the undersigned, offer to provide the services to RFP for supply, installation, commissioning, and maintenance of equipment/machines for mining trades at Govt. ITI Koira in accordance with your Request for Proposal (RFP) dated [Insert Date] and our Technical Proposal.

Our Financial Proposal is as below:

| S. No. | Particulars | Cost without tax (INR) | Cost with applicable tax (INR) |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------|
| A | Cost of Equipment/Machineries (Package No. A, B, C, & D) (Bidder should quote price for the Lot/Lots from a Package/Packages for which the proposal submitted) (Cost of supply of equipment/machineries and cost of their delivery, unloading, installation, commissioning & testing charges etc., warranty, safety certificates etc.) *Note: The bidder must provide Package & Lot wise every equipment cost breakup with this section. | | |
| B | Cost of Simulators with Softwares with perpetual license (Package No. E) (supply of simulators and softwares and cost of their delivery, installation, commissioning & testing charges etc., warranty, safety certificates etc.) *Note: The bidder must provide Lot wise every simulator and software cost breakup with this section | | |
| **Total Bid Price offered by the bidder | | | |
| B | Cost of AMC per year | | |

*Breakup of Package & Lot wise all equipment/software cost to be provided with this section

**Notes:

- The above cost includes Supply, Installation, Commissioning, Testing and other works and services falls under Scope of Work of the Selected Bidder.
- All the cost related to delivery, unloading, installation, commissioning, testing and any other charges should be borne by the bidder.

Our Financial Proposal shall be binding upon us subject to the modifications resulting from contract negotiations, up to expiration of the validity period of the Proposal.

We solemnly affirm that we will strictly adhere to the laws against fraud, corruption and unethical practices, including but not limited to "Prevention of Corruption Act, 1988", during the Request for Proposal (RFP) process and execution of the Contract, in case we are awarded the work. We understand you are not bound to accept any Proposal you receive.

With Regards,

RFP for supply of equipment, installation, commissioning and maintenance at ITI Koira

Signature and Seal

Authorised Signature {In full and initials}:Name and Title of Signatory:

Name and seal of the Bidder

Date:

Place:

Section 8: ANNEXURES

Annexure 1. MANUFACTURER'S (OEM) OFFER FORM

(to be submitted by manufacturer in case the bidder is the manufacturer)

No.

Dated:

To,

The Director,

Directorate of Technical Education and Training, Odisha (DTE&T),

Killa Maidan, Buxi Bazaar, Cuttack, Odisha-753001

Dear Sir,

Bid Reference No:

Equipment Name:

1. We (name of the OEM) declare that we are the original manufacturers of the above equipment having registered office at.....(full address with telephone number/fax number & email ID and website), and having factories at_____.

2. No company or firm or individual have been authorized to bid, negotiate and conclude the contract in regard to this business against this specific bid.

3. We hereby declare that we are willing to provide guarantee/warranty and after sales service during the period of warranty/AMC as per the above bid and also supply spares for a period of 3 years.

4. We also hereby declare that we have the capacity to manufacture and supply, install and commission the quantity of the equipments bided within the stipulated time.

(Name)

for and on behalf of

M/s. _____

(Name of manufacturers)

Date:

Place:

Seal

Note: This letter of authority should be on the letterhead of the manufacturing concern and should be signed by a person competent and having the power of attorney to bind the manufacturer.

Annexure 2. MANUFACTURER'S AUTHORISATION FORM

(to be submitted by authorized distributor/importers in case the bidder is the authorized distributor/importer of OEM)

No.

Dated:

To,

The Director,

Directorate of Technical Education and Training, Odisha (DTE&T),

Killa Maidan, Buxi Bazaar, Cuttack, Odisha-753001

Dear Sir / Madam,

Bid Reference No:

Equipment Name:

1. We (name of the OEM) are the original manufacturers of the above equipment having registered office at(full address with telephone number/fax number & email ID and website), having factories at and, do hereby authorize M/s. _____(Name and address of bidder) to submit bids, and subsequently negotiate and sign the contract with you against the above bid no..

2. No company or firm or individual other than M/s. _____ are authorized to bid, negotiate and conclude the contract in regard to this business against this specific bid.

3. We also hereby undertake to provide full guarantee/warrantee /AMC as agreed by the bidder in the event the bidder is changed as the dealers or the bidder fails to provide satisfactory after sales and service during such period of Comprehensive warranty/AMC and to supply all the spares/reagents during the said period.

4. We also hereby declare that we have the capacity to manufacture and supply, install and commission the quantity of the equipments bided within the stipulated time.

(Name)

for and on behalf of

M/s. _____

(Name of manufacturers)

Date:

Place:

Seal

Note: This letter of authority should be on the letterhead of the manufacturing concern and should be signed by a person competent and having the power of attorney to bind the manufacturer.

Annexure 3. Financial Turnover Certificate Format

<< Declaration to be submitted under the signature of Chartered Accountant on CA firm's Letterhead with his/her dated Sign and Seal >>

TO WHOMSOEVER IT MAY CONCERN

On the basis of audited financial statements, we hereby certify that M/S _____ having registered office at (Office address) has an average annual turnover of INR _____ in the last three financial years, in the past three consecutive years (FY 2017-18, 2018-19, 2019-20).

The details of annual turnover are mentioned below:

| S. No. | Financial Year | Annual Turnover (in INR) |
|----------------|----------------|--------------------------|
| 1 | 2017-2018 | |
| 2 | 2018-2019 | |
| 3 | 2019-2020 | |
| Average | | |

Note: Audited financial statements for the past three years should be submitted by the Bidder.

Chartered Accountant:

Signature

Name Registration No./ Membership No.

Contact No.

Seal

Date:

Place:

Note: This turnover statement should also be supported by copies of audited annual statement of the last three years/Annual Report and the turnover figure should be highlighted there.

Annexure 4: STATEMENT OF DEVIATION – TECHNICAL SPECIFICATION

Following are the Technical deviations and variations from the purchaser’s Technical Specifications.

| SI No. | Item Name | Clause of Technical Specification | Statement of Deviations /Variations if any |
|---------------|------------------|------------------------------------------|---------------------------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

(attach separate sheets if the space provided is not sufficient)

In case there is no deviation from technical specification, Pl. Mention **No Deviation**.

Signature of the Bidder

Name :

Date :

Place :

Seal

Annexure 5: PARAWISE COMPLIANCE TO TECHNICAL SPECIFICATION OF THE PRODUCT(S) OFFERED

[Furnish parawise compliance in a tabular form (as per the format mentioned below), where the technical specification (parawise) as per bid should be mentioned in the left column & bidder's compliance at the right with mention of page no. of the product catalogue].

Name of the Item:

Make:

Model No.:

| Bid Specification (Para wise) | *Bidder's Compliance – Para wise | **Page No. of the technical brochure where the compliance is mentioned |
|--------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

(add separate sheets depending upon the space requirement)

* Leaflets/Technical Brocheures of the product offered must be attached in support of the information provided above.

** It is mandatory to mention the page no(s) in the format as mentioned above.

Signature of the Bidder

Name:

Date:

Place:

Seal

Annexure 6: Format for Declaration of Non-Blacklisting by the Bidder

<< An affidavit on a non-judicial stamp paper of INR 10/- by Company Secretary/ Authorized Representative and Signatory of the Applicant with his/her dated Sign and Seal >>

AFFIDAVIT

I/We do hereby declare I/We have not been de-recognised / black listed by any State Govt. / Union Territory / Govt. of India / Govt. Organization / Govt. Institutions for supply of Non-standard quality equipment/ Non-supply.

I/We agree that the DTE&T can forfeit the Performance Security Deposit and blacklist me/us for a period of 3 years if, any information furnished by us proved to be false at the time of inspection / verification and not complying with the Bid terms & conditions.

I / Wedo hereby declare that I / we will supply the as per the terms, conditions & specifications of the bid document. I / we further declare that I / we have a service centre in Odisha / Eastern India to carry out the maintenance of the equipment offered.

For and on behalf of:

Signature:

Name:

Designation: (Authorized Representative and Signatory)

Date:

Place:

Annexure 7: Format for Power of Attorney

<<Required only if the Signatory is not directly authorized by the Company Board/ Governing Body, or Partners. Otherwise, the Board Resolution/ Partners Resolution would suffice>>

Date:

To,

The Director,

Directorate of Technical Education and Training, Odisha (DTE&T),

Killa Maidan, Buxi Bazaar, Cuttack, Odisha-753001

Dear Sir,

Sub: RFP for Supply, installation, commissioning, & maintenance of equipment at Govt. ITI Koira

<Name of the Applicant> hereby authorizes to act as a representative of <Name of the Company>for the following activities vide its Board Resolution (and Power of Attorney if applicable) attached herewith.

To attend all meetings conducted by DTE&T and shall discuss, negotiate, finalize and sign any Proposal or agreement and contract related to RFP.

Yours faithfully,

For and on behalf of:

Signature:

Name:

Designation:

Date:

Place:

Annexure 8: Format for Bid Security Declaration Submission

(Bid Security Declaration must be submitted in a non-judicial stamp paper of INR 100 with notarize)

Tender Ref. No.: _____

Dated: _____

To,
Director of Technical Education and Training, Odisha
Killa Maidan, Buxi Bazaar, Cuttack- 753001

I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of five years from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

- a) have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
- b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity
 - (i) fail or refuse to execute the contract, if required, or
 - (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)

in the capacity of (insert legal capacity of person signing the Bid Securing Declaration)

Name: (insert complete name of person signing the Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of (insert complete name of Bidder)

Dated on _____ day of _____ (insert date of signing) Corporate Seal (where appropriate)

Annexure 9: Bank Guarantee Format for Performance Security (only for selected bidder)
(Performance Security must be submitted in a non-judicial stamp paper of INR 100 with notarize)

To
The Director,
Directorate of Technical Education and Training, Odisha
Killa Maidan, Buxi Bazaar, Cuttack- 753001.

WHEREAS <<Name and address of the supplier>> (hereinafter called “the supplier”) has undertaken, in pursuance of contract no.....dated..... to supply (description of goods and services) (herein after called “the contract”).

AND WHEREAS it has been stipulated by you in the said contract that the supplier shall furnish you with a bank guarantee by a scheduled commercial bank recognized by you for the sum specified therein as security for compliance with its obligations in accordance with the contract;

AND WHEREAS we have agreed to give the supplier such a bank guarantee;

NOW THEREFORE we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of(amount of the guarantee in words and figures), and we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of (amount of guarantee) as aforesaid, without your needing to prove or to show ground or reasons for your demand or the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the supplier before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract to be performed there under or of any of the contract documents which may be made between you and the supplier shall in any way release us from any liability under this guarantee and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until the.....day of.....,20.....

Our branch at* (Name & Address of the

.....* branch) is liable to pay the guaranteed amount depending on the filing of claim and any part thereof under this Bank Guarantee only and only if you serve upon us at our * branch a written claim or demand and received by us at our* branch on or before Dt.....otherwise bank shall be discharged of all liabilities under this guarantee thereafter.

.....
..... (Signature of the authorized officer of the Bank)
.....
..... Name and designation of the officer
.....
.....
.....Seal, name & address of the Bank and address of the Branch

* Preferably at the headquarters of the authority competent to sanction the expenditure for purchase of goods or at the concerned district headquarters or the State headquarters.

Annexure 10: Acceptance of Terms & Conditions contained in the RFP Document

Date:

To
The Director,
Directorate of Technical Education and Training, Odisha
Killa Maidan, Buxi Bazaar, Cuttack- 753001

Dear Sir,

I/ We have carefully gone through the Terms & Conditions contained in the Tender No. _____, regarding RFP Name <_____>.

I/ We declare that all the provisions of this RFP Document are acceptable to my company. I further certify that I am an authorized signatory of my company and I am, therefore, competent to make this declaration.

Signature of witness
Date:
Place:

Signature of the Bidder
Date:
Place:

Company Seal

Annexure 11: Declaration of correctness and authenticity of information provided in the Full Technical Proposal

To,
The Director,
Directorate of Technical Education and Training, Odisha
Killa Maidan, Buxi Bazaar, Cuttack- 753001.

Dear Sir,

We _____ (Bidder name) having principal office at _____ (address) do hereby confirm that the information submitted in TECH FORM I, TECH FORM II and TECH FORM III under Section 7 are true to our knowledge and belief. We understand that any falsification of data may lead to cancellation of our Bids.

Yours Sincerely,

Signature: (Authorized Signatory as per Power of

Attorney) Name:

Designation:

Phone:

Email:

Annexure 12: Proposal Submission Compliance Check List

RFP No: _____, Date: _____

Please check whether following have been enclosed.

| S. No | Enclosure description | Enclosed (Y/N) | Annexure/Attachment / Page No./ Envelop No. of the enclosure |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------|
| 1. | Bid processing Fee | | |
| 2. | Bid Security Declaration - Annexure 8 | | |
| 3. | Tech Form I – Proposal Submission Letter | | |
| 4. | Tech Form II – Bidder’s Profile | | |
| 5. | Tech Form III – Bidder’s Experience | | |
| 6. | Copies of purchase orders & end user certificates in support of the information furnished in Tech Form III | | |
| 7. | Fin Form I – Financial Form Format | | |
| 8. | Self-declaration in case the bidder is an OEM as per Annexure - 1 | | |
| 9. | Authorization letter (Manufacturer’s authorization letter – in case the bidder is the authorized distributor of OEM) as per Annexure - 2 | | |
| 10. | Annual Average Turnover Statement by Chartered Accountant as per Annexure - 3 | | |
| 11.a | Copies of the annual audited statement / Annual Report for 2017-18, 2018-19, 2019-20 (Provisional statement of account shall not be considered) | | |
| 11.b | In case of distributor, Annual average turnover statement & annual audited statement / Annual report for both the distributor as well as the manufacturer (OEM) | | |
| 12. | Statement of deviation – Technical Specification as per Annexure - 4 | | |
| 13. | Para-wise compliance to Technical Specification as per Annexure - 5 | | |
| 14. | Copy of the Leaflets / Technical Brochures of the Model offered in support of the information provided in Format – Annexure 5 | | |
| 15. | Copy of Quality Certificates (valid ISI / BIS / CE / US FDA / IEC etc. & ISO) of the product / organization (As per Section 1 - Technical Specification). | | |
| 16. | Copy of the GST registration certificate and Copy of PAN | | |
| 17. | An affidavit for not being blacklisted as per Annexure-6 | | |
| 18. | Power of Attorney as per Annexure - 7 | | |
| 19. | Format for Bid Security Declaration Submission as per Annexure - 8 | | |
| 20. | Bank Guarantee Format for Performance Security as per Annexure - 9 | | |
| 21. | Acceptance of Terms & Conditions contained in the RFP Document as per Annexure - 10 | | |
| 22. | Declaration of correctness and authenticity of information provided in the Full Technical Proposal as per Annexure - 11 | | |
| 23. | Proposal Submission Compliance Check List as per Annexure - 12 | | |
| 24. | Self-Declaration regarding “Restrictions on procurement from a Bidder of a country which shares a land border with India” as per Annexure - 13 | | |

Annexure 13: Self-Declaration regarding “Restrictions on procurement from a Bidder of a country which shares a land border with India”

(To be submitted on Bidder’s Letter Head)

Tender Ref. No.: _____

Dated: _____

To,

The Director

Directorate of Technical Education and Training, Odisha

KillaMaidan, Buxi Bazaar, Cuttack- 753001

Phone No-0671 (2301061); Email: dtetorissa@gmail.com

Dear Sir,

In reference to bid submitted by M/s _____ against DTE&T Odisha’s Tender NIT Number: _____, I/We have read the Order No: 27945 /F; dated: 16-10-2020 from Government of Odisha Finance Department regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries.

I/We certify that M/s _____ (name of Bidder) is not from such a country and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I also certify that M/s _____ will not offer any products/services of entity from such countries unless such entity is registered with the Competent Authority.

I/We certify that we/our Collaborator/Tie-Up Partners are/is not from such a country or, if from such a country, have/has been registered with the Competent Authority and we will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority.

We hereby certify that we fulfil all requirements in this regard and are eligible to be considered.

Date : _____

Place : _____

Seal of Organization & Signature
of Authorized Applicant

Annexure 14: Technical Specifications of 145 KV (SF6) Circuit Breaker

PRINCIPAL PARAMETERS

The breaker shall conform to the specific technical requirements specified hereunder:

| SL No | Item | Requirements |
|-------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1 | Rated voltage (KV rms) frequency (Hz) | 145, 50HZ |
| 2 | Continuous current rating (A) rms | 3150 |
| 3 | Type | Outdoor SF6 |
| 4 | Mounting | Hot dip galvanized lattice steel support structure to be supplied by the Bidder |
| 5 | Number of Poles | 3 |
| 6 | Type of Operation | Gang Operated |
| 7 | Phase to phase spacing in the switchyard i.e. interpole spacing for breaker (mm) | 2150 |
| 8 | Required ground clearance from the lowest live terminal (mm): | |
| I | If both the terminals are not in the same horizontal plane | - |
| II | If both the terminals are in the same horizontal plane | 4600 |
| 9 | Height of concrete plinth provided by the Owner) mm. | 300 |
| 10 | Minimum height of the lowest part of the support insulator from ground level (mm) | 2550 |
| 11 | Operating Mechanism | spring charged(Spring-Spring) |
| 12 | Auto reclosing duty | Single Phase |
| 13 | Rated operating duty cycle | 0-0.3 sec-co-3 min-co |
| 14 | First pole to clear factor | 1.3(As per IEC-62271-100) |
| 15 | Type of tripping | Trip free |
| 16 | Max. closing time(ms) | 60 |
| 17 | Max. BREAK TIME (ms) | 30 ± 4 |
| 18 | 1.2/50 microsecond impulse withstand voltage: (dry) | |
| I | To earth(kvp) | 650 |
| II | Across the open contacts with impulse on one terminal and power frequency voltage on opposite terminal (kvp/kv rms) | 650 |
| 19 | 1 minute power frequency withstand voltage (kv rms) (wet) | 275 |
| 20 | Max. radio interference voltage (micro volts) at 1.1 times maximum phase voltage | 500 |
| 21 | Min. corona extinction voltage (kv rms) | 105 |
| 22 | Rated breaking current capacity: | |
| I | Line charging at rated voltage at 90 deg. Leading power factor (A) rms | |
| II | Small inductive current (A) | -----0.5 to 10----- without switching o/v exceeding 2.3 p.u. |
| III | Short circuit current | |
| a. | AC component (kA) | 40 |

| | | |
|----|--------------------------------------------------------------------------|-----------------------------------------------------------|
| b. | % DC component | 25% |
| 23 | Rated short circuit making current capacity (kA) | 79 |
| 24 | Permissible limit of temperature rise | As per Clause 5.29 |
| 25 | Max. acceptable difference in the instant of closing/opening of contacts | |
| I | Within a pole (ms) | 5 |
| II | Between poles (ms) | 10 |
| 26 | Min. creepage distance of support insulator(mm) | 3625 |
| 27 | Short time current carrying capability for three second (kA) | 40 |
| 28 | Rating of auxiliary contacts | ----10A at 220 V D.C.---- |
| 29 | Breaking contact | 2 A DC with the circuit time constant not less than 20 ms |
| 30 | Noise level at base and upto 50 metres | -----140 dB (max.)----- |
| 31 | Seismic acceleration | -----0.3g----- |

GENERAL TECHNICAL REQUIREMENTS

- 1 Circuit breaker offered shall be sulphur hexafluoride (SF6) type only.
- 2 Any part of the breaker, especially the removable ones, shall be freely interchangeable without the necessity of any modification at site.
- 3 Circuit breaker shall comprise of three identical single pole units. If the circuit breaker not meant for single pole reclosure, these units shall be linked together electrically . Complete circuit breaker with all the necessary items for successful operation shall be supplied, including but not limited to the following:
 - 3.1 Breaker assemblies with bases, support structure for circuit breaker as well as for control cabinet, Ladder, central control cabinet and foundation bolts for main structure as well as control cabinet and central control cabinet (except concrete foundations), terminals and operating mechanisms.
 - 3.2 Compressed SF6 gas, spring operated systems complete including piping, fittings, valves and controls and etc.
 - 3.3 One central control cabinet for each breaker and one control box for each pole with all the required electrical devices mounted therein and the necessary terminal blocks for termination of interpole wiring. The necessary interpole cabling at site shall be done by the Purchaser based on the schematic, wiring diagram and termination schedule to be supplied by the Supplier.
 - 3.4 Instruments, pressure gauges and other devices like gas density monitor, temp. monitor & etc. for SF6 gas pressure supervision.
 - 3.5 All necessary parts to provide a complete and operable circuit breaker installation such as main equipment, terminal, control parts, connectors and other devices, whether specifically called for herein or not.
- 4 The circuit breaker shall be designed for high speed single and three pole reclosing with and operating sequence and timing as specified in clause 4.0 —Principal Parameters§.

5 The support structure of circuit breaker as well as that of control cabinet shall be hot dip galvanized. The minimum weight of zinc coating shall be 610 gm/sq.m and minimum thickness of coating shall be 86 microns for all items thicker than 5 mm.

6 Circuit breaker shall be suitable for hot line washing.

7 All breakers shall be supplied with terminal connectors. The exact requirement of terminal connectors would be intimated to the supplier during the course of detailed engineering(during drawing approval).

8 Terminal pads shall have silver plating of atleast 50 microns thickness.

9 CONTACTS

9.1 All making and breaking contacts shall be sealed free from atmospheric effects. Contacts shall be designed to have adequate thermal and current carrying capacity for the duty specified and to have a life expectancy so that frequent replacements due to excessive burning will not be necessary. Provision shall be made for rapid dissipation of heat generated by the arc on opening.

9.2 Main contacts shall be first to open and the last to close so that there will be little contact burning and wear. If arcing contacts are used they shall be first to close and the last to open. Tips of arcing contacts and main contacts shall be silver plated or made of superior material like graphite.

9.3 Any device provided for voltage grading to damp oscillations or to prevent restrike prior to the complete interruption of the circuit or to limit over voltages on closing shall have a life expectancy comparable to that of the breaker as a whole.

9.4 Breakers shall be so designed that when operated within their specified rating, the temperature of each part will be limited to values consistent with a long life or the material used. The temperature shall not exceed that indicated in IEC-56 under specified ambient conditions.

9.5 Contacts shall be kept permanently under pressure of SF6 gas. The gap between the open contacts shall be such that it can withstand atleast the rated phase to ground voltage continuously at zero gauge pressure of SF6 gas due to its leakage.

9.6 If multibreak interrupters are used these shall be so designed and augmented that a uniform voltage distribution is developed across them. Calculations/test reports in support of the same shall be furnished along with the bid. The thermal and voltage withstands of the grading elements shall be adequate for the service conditions and duty specified.

10 PORCELAIN HOUSING

10.1 The porcelain housing shall be of single piece construction without any joint or coupling. It shall be made of homogeneous, vitreous porcelain of high mechanical and dielectric strength. Glazing of porcelain shall be uniform brown or dark brown colour with a smooth surface arranged to shed away rain water or condensed water particles (fog). The type and profile of the porcelain insulator sheds shall be in accordance with IEC-815 joints as per IEC- 233.

11 ADDITIONAL REQUIREMENTS :

a) The circuit breakers shall be single pressure type, the design and construction of the circuit breaker shall be such that there is minimum possibility of gas leakage and entry of

moisture. There should not be any condensation of SF6 gas on the internal insulating surface of the circuit breaker.

b) All gasketed surfaces shall be smooth, straight and reinforced, if necessary to minimize distortion and to make a tight seal, the operating rod connecting the operating mechanism to the arc chamber (SF6 media) shall have adequate seals, Double –O–ring seals and test holes for leakage test of the internal seal shall be provided on each static joint.

- c) In the interrupter assembly there shall be an absorbing product box to eliminate SF6 decomposition products and moisture. The material used in the construction of the circuit breakers shall be fully compatible with SF6 gas.
- d) Each pole shall form an enclosure filled with SF6 gas independent of two other poles. The SF6 density of each pole shall be monitored and regulated by individual pressure switches.
- e) The SF6 gas density monitor shall be adequately temp. compensated. The density monitor shall meet the following requirements:
 - i) It shall be possible to dismantle the density monitor for checking/replacement without draining the SF6 gas by using suitable interlocked non-return couplings.
 - ii) It shall damp the pressure pulsation while filling the gas in service so that the flickering of the pressure switch contacts does not take place.
 - iii) A pressure indicator (pressure gauge) shall also be supplied.
- f) Means for pressure relief shall be provided in the gas chamber of circuit breaker to avoid the damages or distortion during occurrence of abnormal pressure increase or shock waves generated by internal electric fault occurs. The position of vents, diaphragms and pressure relief devices shall be so arranged as the minimize danger to the operators in the event of gas or vapour escaping under pressure.
- g) Facility shall also be provided to reduce the gas pressure within the breaker to a value not exceeding 8 millibars within 4 hours or less. Each circuit breaker shall be capable of withstanding this degree of vacuum without distortion or failure of any part.
- h) Sufficient SF6 gas shall be provided to fill all the circuit breakers installed. In addition to this 20% of the total gas requirement shall be supplied in separate cylinders as spare requirement.
- i) Provisions shall be made for attaching an operation analyzer after installation at site to record contact travel, speed and making measurement of operation timings, pre insertion timing of closing resistor, synchronization of contacts in one pole.

5.12 SULPHUR HEXAFLUORIDE GAS (SF6 GAS) :

- a) The SF6 gas shall comply with IEC-376, 376A and 376B and be suitable in all respects for use in the switchgear under the worst operating conditions.
- b) The high pressure cylinders in which the SF6 gas is shipped and stored at site shall comply with requirements of the following standards and regulations:
IS:4379 Identification of the contents of industrial gas cylinders.

IS: 7311 Seamless high carbon steel cylinders for permanent and high pressure liquifiable gases.
The cylinders shall also meet Indian Boiler regulations.

- c) Test: SF6 gas shall be tested for purity, dew point, break down voltage, water contents as per IEC-376, 376A and 376B and test certificates shall be furnished to owner indicating all the tests as per IEC-376 for each lot of SF6 gas.

14 DUTY REQUIREMENTS

14.1 The circuit breaker shall be totally restrike free under all duty conditions. Opening resistors shall not be used.

14.2 The circuit breaker shall meet the duty requirements for any type of fault or fault location, for line charging and dropping when used on an effectively grounded system and perform make and break operations as per stipulated duty cycles satisfactorily. It shall withstand the maximum expected dynamic loads (including the seismic) to which the circuit breaker may be subjected during its 45 years service life.

14.3 The circuit breaker shall be capable of:

- i) Interrupting the steady and transient magnetizing current corresponding to 420 kv/245 KV and 145 KV class transformers of 100 MVA & 160 MVA ratings respectively.
- ii) Interrupting line charging current as given in clause 4.0, —Principal Parameters| of this specification with a temporary overvoltage as high as 1.5 p.u. without restrikes.
- iii) Clearing short line faults (Kilometric faults) with source impedance behind the bus equivalent to

symmetrical fault current specified.

- iv) Breaking inductive currents of 0.5 to 10 A without switching overvoltage exceeding 2.3 p.u.
- v) Breaking 25% of the rated fault current at twice rated voltage under phase opposition condition.

14.4 The critical current, which gives the longest arc duration at lockout pressure of extinguishing medium and the arc duration shall be indicated.

14.5 The breaker shall satisfactorily withstand the high stresses imposed on them during fault clearing, load rejection and re-energization of lines with trapped charges. The breaker shall ALSO WITHSTAND THE VOLTAGE SPECIFIED IN CLAUSE 4.0 —principal Parameters| of this specification.

15 TOTAL BREAK TIME

15.1 The —Total Break Time| as specified in clause 4.0, —Principal Parameters| of this section shall not be exceeded under any of the following duties:

- i) Test duties 1,2,3,4,5 (with TRV as per IEC-62271-100)/as per related IS.
- ii) Short line fault L90, L75 (with TRV as per IEC-62271-100) /as per related IS.

15.2 The Bidder may please note that there is only one specified break time of the breaker which shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage, (70-110%) spring-spring operation and arc extinguishing medium pressure etc. while furnishing the proof for the total break time of complete circuit breaker, the Bidder may specifically bring out the effect of non-simultaneity between contacts within a pole or between poles and show how it is covered in the guaranteed total break time.

15.3 The values guaranteed shall be supported with the type test reports.

16 OPERATING MECHANISM AND ASSOCIATED EQUIPMENTS

16.1 The circuit breaker shall be designed for electrical local as well as remote control. In addition there shall be provision for local mechanical control (emergency trip).

16.2 SPRING OPERATED MECHANISM:

The operating mechanism for 420 Kv/245 KV / 145 KV class breakers shall be of spring –spring type only operated by electrical control. The mechanism shall be adequately designed for the specified tripping and re closing duty. The entire operating mechanism control circuitry & etc as required, shall be housed in an outdoor type, with Aluminium alloy enclosure(minimum 3mm thickness). This enclosure shall conform to the degree of protection IP-55 of IS- 2147. The enclosure shall be invariably mounted on a separate concrete plinth.

16.3 All working parts in the mechanism shall be of corrosion resistant material. All bearings which require greasing, shall be equipped with pressure grease fittings.

16.4 The design of the operating mechanism shall be such that it shall be practically maintenance free. The guaranteed years of maintenance free operation, the number of full load and full rated short circuit current breaking/operation without requiring any maintenance or

overhauling, shall be clearly stated in the bid. As far as possible the need for lubricating the operating mechanism shall be kept to the minimum and eliminated altogether if possible.

16.5 The operating mechanism shall be non-pumping (and trip free) electrically and mechanically under every method of closing. There shall be no rebounds in the mechanism and it shall not require any critical adjustments at site. Operation of the power operated closing device, when the circuit breaker is already closed, shall not cause damage to the circuit breaker or endanger the operator, provision shall be made for attaching an operation analyzer to facilitate testing of breaker at site.

16.6 A mechanical indicator shall be provided to show open and close position of the breaker. It shall be located in a position where it will be visible to a man standing on the ground level with the mechanism housing closed. An operation counter shall also be provided in the central control cabinet.

16.7 The supplier shall furnish detailed operation and maintenance manual of the mechanism along with the operation manual for the circuit breaker.

16.8 The Breaker shall have spare auxiliary switches for Owners use (I.e, for Interlocking, indication, contacts to main and back up relay etc). A minimum of 20 N/O(52a) & 20 N/C (52b) spare auxiliary switch contacts should be provided.

17 CONTROL

17.1 The close and trip circuits shall be designed to permit use of momentary contact switches and push buttons.

17.2 Each breaker pole shall be provided with two (2) independent tripping circuits, valves and coils each connected to a different set of protective relays.

17.3 The breaker shall normally be operated by remote electrical control. Electrical tripping shall be performed by shunt trip coils. However, provisions shall be made for local electrical control. For this purpose a local / remote selector switch and close and trip push buttons shall be provided in the breaker central control cabinet. Remote located push buttons and indicating lamps shall be provided by purchaser.

17.4 The trip coils shall be suitable for trip circuit supervision. The trip circuit supervision relay would be provided by the purchaser. Necessary terminals shall be provided in the central control cabinet of the circuit breaker by the supplier.

17.5 Closing coil shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. Shunt trip shall operate correctly under all operating conditions of the circuit breaker upto the rated breaking capacity of the circuit breaker and at all values of supply voltage between 70% and 110% of rated voltage. However, even at 50% of rated voltage, the breaker shall be able to perform all its duties. If additional elements are introduced in the trip coil circuit their successful operation and reliability for similar applications on outdoor circuit

breakers shall be clearly brought out in the additional information schedules. In the absence of adequate details the offer is likely to be rejected.

17.6 Suitable relay for monitoring of DC supply voltage to the control cabinet shall be provided. The pressure switches used for interlock purposes shall have adequate contact ratings to be directly used in the closing and tripping circuits. In case the contacts are not adequately rated and multiplying relays are used then the interlock for closing/opening operation of breaker shall be with No logic of the relay i.e. if the DC supply to the interlock circuit fails then operation lockout shall take place.

17.7 For all types of operating mechanism a local manual closing device which can be easily operated by one man standing on the ground shall also be provided for maintenance purposes and direction of motion of handle shall be clearly marked.

17.8 The auxiliary switch of the breaker shall be preferably positively driven by the breaker operating rod and where due to construction features, same is not possible a plug in device shall be provided to simulate the opening and closing operations of circuit breaker for the purpose of testing control circuits.

18 MOTOR COMPRESSED SPRING CHARGING MECHANISM

Spring operated mechanism shall be complete with motor, opening spring, closing spring and all other necessary accessories to make the mechanism a complete unit. Breaker operation shall be independent of motor which shall be used solely for the purpose of charging the closing spring. Motor rating shall be such that it requires only 15 seconds for fully charging the closing spring. Closing operation shall compress the opening spring and keep ready for tripping. The mechanism shall be provided with means for charging the spring by hand. This operation shall be carried out with the doors of the cubicle open. During the process no electrical or mechanical operation of the mechanism shall endanger the operator or damage the equipment. A mechanical indicating device shall be provided to indicate the state of the charge spring and shall be visible with the door of the cubicle closed. An alarm shall be provided for spring failing to be charged within a pre-set time after circuit breaker closing. The spring mechanism shall be fitted with a local manual release, preferably by a push button to avoid inadvertent operation. Means shall be provided for discharging the spring when the circuit breaker is in the open position without circuit breaker attempting to close.

Opening spring and closing spring with limit switches for automotive charging and other necessary accessories to make the mechanism a complete operating unit shall also be provided.

As long as power is available to the motor, a continuous sequence of the closing and opening operations shall be possible. The motor shall have adequate thermal rating for this duty.

After failure of power supply to the motor one close open operation shall be possible with the energy contained in the operating mechanism.

Breaker operations shall be independent of the motor which shall be used solely for compressing the closing spring. Facility for manual charging of the closing spring shall also be provided. The motor rating shall be such that it requires not more than 15 seconds for full charging of the closing spring.

Closing action of the breaker shall compress the opening spring ready for tripping.

When closing spring are discharged after closing a breaker, closing spring shall automatically be charged for the next operation and an indication of this shall be provided in the local and remote control cabinet.

The spring operating mechanism shall have adequate energy stored in the operating spring to close and latch the circuit breaker against the rated making current also to provide the required energy for the tripping mechanism in case the tripping energy is derived from the operating mechanism.

Provision shall be made to prevent a closing operation of the breaker when the spring is in the partial charged condition. Mechanical interlocking shall be provided in the operating mechanism to prevent discharging of closing spring when the breaker is already in the closed position.

18.1 OPERATED MECHANISM FOR 400 KV BREAKERS.

The operating mechanism for 420 KV circuit breakers shall also be spring operated mechanism.(Closing spring and opening also spring).

19 OPERATING MECHANISM HOUSING

The operating mechanism housing/control cabinet shall conform to the requirement specified in clause 5.29. The entire operating mechanism and control mechanism control circuitry & etc as required, shall be housed in an outdoor type, made out of Aluminium alloy sheet of 3mm thickness enclosure. This enclosure shall conform to the degree of protection IP-55 of IS- 2147.

20 INTERLOCKS

It is proposed to electrically interlock the circuit breaker with purchaser's associated air break isolating switches in accordance with switch yard safety interlocking scheme. The details of the scheme will be furnished to the supplier. All accessories required on breaker side for satisfactory operation of the scheme shall be deemed to be included in the scope of supply of this specification.

21 SUPPORT STRUCTURE

The supplier shall indicate the price of support structure along with the foundation bolts required separately in the bid proposal sheets and these shall be considered in evaluation. Purchaser reserves the right to procure these from the supplier or through separate contract. However, in case the equipment offered have integral support structure or the specialties of the breaker are such that support structures have to be provided by the supplier, the prices of these support structure shall be included in the price of the equipment and same shall be indicated clearly in the bid proposal sheet. The support structure shall meet the following requirements:

- 1) The minimum vertical clearance from any energized metal part to the bottom of the circuit breaker (structure) base, where it rests on the foundation pad, shall be minimum 8 mtrs for 400 KV, 5.5 mtrs for 245KV & 4.6 mtrs for 145 KV.
- 2) The minimum vertical distance from the bottom of the lowest porcelain part of the bushings, porcelain enclosures or supporting insulators to the bottom of the circuit breaker base, where it rests on the foundation pad shall be 2.55 mtrs. for all voltages.
- 3) The minimum clearance between the live parts and earth shall be 3.5 mtrs for 400 KV, 2.4 mtrs for 245 KV and 1.5 meters for 145 KV.

22 FITTINGS AND ACCESSORIES

22.1 Following is a partial list of some of the major fittings and accessories to be furnished by supplier in the central control cabinet. Number and exact locations of these parts shall be indicated in the bid.

- a) Central control cabinet in accordance with clause no. 5.29 complete with

- i) Cable glands.
- ii) Local/remote changeover switch.
- iii) Operation counter.
- iv) SF6 pressure gauges.
- v) Control switches to cut off control power supply.
- vi) Fuses as required.
- vii) The number of terminals provided shall be adequate enough to wire out all contacts and control circuits plus 24 terminals spare for owner's use.
All the terminal blocks to be used in the operating mechanism and control cubicle should be of stud type of Poly-amide/Melamine material of make like Elmex (OAT-6 for non-disconnecting type and OAT 6T for disconnecting type) / Connectwell (Equivalent).
- b) Anti-pumping relay.
- c) Rating and diagram plate in accordance with IEC / IS incorporating year of manufacture.

23 PAINTING, GALVANISING AND CLIMATE PROOFING

23.1 All interiors and exteriors of tanks and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter and the surfaces treated by phosphating (e.g. seven tank phosphating sequence). All steel surfaces in contact with insulating oil, as far as accessible, shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paint.

23.2 All metal surfaces exposed to atmosphere shall be given, in addition to the treatment described in clause 5.23 two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limits specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling. All external paintings shall be as per shade no. 697 of IS:5.

23.3 Paint inside the metallic housing shall be of anti-condensation type and the paint on outside surfaces shall be suitable for outdoor installation.

1.23.4 All components shall be given adequate treatment of climate proofing as per IS:3202 so as to withstand corrosive and serve service conditions.

24 GALVANISING

All ferrous parts including all sizes of nuts, bolts, support channels, structures, etc. as also the mechanism housing shall be hot dip galvanized conforming to latest version of IS:2629. Spring washers shall be electro galvanized.

25 EARTHING

The operating mechanism housing, control cabinets, dead tanks, support structure etc. shall be provided with two separate earthing terminals suitable for bolted connection to 50X8 mm mild steel flat to be provided by the Purchaser for connection to station earth mat.

26 NAME AND RATING PLATES:

Circuit breaker and its operating device shall be provided with a rating plate or plates marked with but not limited to following data:

- a) Manufacturer's name or trade mark.

- b) Serial Number or type designation making it possible to get all the relevant information from the manufacturer.
- c) Year of manufacture.
- d) Rated voltage.
- e) Rated insulation level.
- f) Rated frequency.
- g) Rated normal current.
- h) Rated short circuit breaking current.
- i) First pole to clear factor.
- j) Rated duration of short circuit.
- k) Rated auxiliary D.C. supply voltage of closing and opening devices.
- l) Rated pressure of compressed air gas for operation and interruption.
- m) Rated out of phase breaking current.
- n) Rated supply voltage of auxiliary circuits.
- o) Rated supply frequency of auxiliary circuits.
- p) Number of closing & Tripping coils
- q) Opening time & closing time

Other information are as per IS 12729/IEC 60694.

The coils of operating devices shall have a reference mark permitting the data to be obtained from the manufacturer.

The rating plate shall be visible in position of normal service and installation. The rating plate shall be weather proof and corrosion proof.

27 LIMITS OF TEMPERATURE RISE

The temperature rise on any part of equipment shall not exceed the maximum temperature rise specified below under the conditions specified in test clauses. The permissible temperature rise indicated is for a maximum ambient temperature of 50 deg. C. If the maximum ambient temperature rises, permissible values shall be reduced accordingly.

| SL No. | Nature of the part or of the liquid | Maximum Value of | |
|--------|------------------------------------------------------------------------|------------------|-----------------------------------------------------------------|
| | | Temp. | Temp. rise at a max. ambient air temp. not exceeding 50 deg. C. |
| 1 | . | 105 | 55 |
| | Bare copper or tinned aluminium alloy. | 75 | 25 |
| 2 | Contacts in oil: Silver-faced copper, copper alloy or aluminium | 90 | 40 |

| | | | |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------|
| | alloy (see note ii) Bare copper or tinned aluminium alloy | 80 | 30 |
| 3 | Terminals to be connected to external conductors by screws or bolts silver faced (see note iii) | 105 | 55 |
| 4 | Metal parts acting as springs | See Note iv | See note iv |
| 5 | Metal parts in contact with insulation of the following classes: Class Y: (for non-impregnated materials) Class A: (for materials immersed in oil or impregnated) Class E: in air in oil Class B: in air in oil Class F: in air in oil Enamel: Oil base Synthetic, in air Synthetic, in oil | 90 100 120 100 130 100 155 100 100 120 100 | 40 50 70 50 80 50 105 50 50 70 50 |
| 6 | Any part of metal or of insulating material in contact with oil, except contacts | 100 | 50 |
| 7 | Oil | 90 | 40 |

Notes:(i) When applying the temperature rise of 55 deg. C, care should be taken to ensure that no damage is caused to the surrounding insulating materials.

(ii) The quality of the silver facing shall be such that a layer of silver remains at the points of contact after the mechanical endurance test. Otherwise, the contacts shall be regarded as —barell.

(iii) The values of temperature and temperature rise are valid whether or not the conductor connected to the terminals is silver-faced.

(iv) The temperature shall not reach a value whether the elasticity of the material is impaired. For pure copper, this implies a temperature limit of 80 deg. C.

28 TERMINAL CONNECTORS

28.1 The terminal connectors shall meet the following requirements:

- a) Terminal connectors shall be manufactured and tested as per IS: 5561.
- b) All castings shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.
- c) No part of a clamp shall be less than 10 mm thick.
- d) All ferrous parts shall be hot dip galvanized conforming to IS: 2633.
- e) For bimetallic connectors, copper alloy liner of minimum thickness of 2 mm shall be cast integral with

aluminium body.

- f) Flexible connectors shall be made from tinned copper.
- g) All current carrying parts shall be designed and manufactured to have minimum contact resistance.
- h) Connectors shall be designed to be corona free in accordance with the requirements stipulated in IS: 5561.

29 SPECIFICATION FOR CONTROL CABINETS:

1. Control cabinets shall be of the free standing floor mounting type.
2. Control cabinet of the operating mechanism shall be made out of Aluminium alloy sheet (minimum 3 mm thickness). The operating mechanism shall be strong, rigid & not subject to rebound. Hinged door shall be provided with padlocking arrangement. Sloping rain hood shall be provided to cover all sides. 15 mm thick neoprene or better type of gaskets shall be provided to ensure degree of protection of at least IP55 as per IS: 2147.
3. Bus bars shall be of tinned copper of adequate cross-section to carry the normal current, without exceeding the permissible temperature rise over an ambient temperature of 50 deg. C outside the cubicle. The buses shall be braced to withstand forces corresponding to short circuit current of 25 KA.
4. Motors rated 1 kw and above being controlled from the control cabinet would be suitable for operation on a 415 V, 3 phase 50 Hz system. Fractional KW motors would be suitable for operation on a 240 V, 1-phase, 50 Hz supply system.
5. Isolating switches (MCBs) shall be group operated units (3 pole for use on 3-phase supply systems and 2 pole for single phase supply systems) quick make quick break type, capable of breaking safely and without deterioration, the rated current of the associated circuit. Switch handle shall have provision for locking in both fully open and fully closed positions.
6. Push buttons shall be rated for not less than 6 Amps, 415 V A.C. or 2 Amps, 220 V D.C. and shall be flush mounted on the cabinet door and provided with appropriate name plates. Red, Green and Amber indicating lamps shall be flush mounted.
7. For motors up to 5 KW, contactors shall be direct-on-line, air break, single throw type and shall be suitable for making and breaking the stalled current of the associated motor which shall be assumed equal to 6.5 times the full load current of the motor at 0.2 p.f. For motors above 5 KW, automatic star delta type starters shall be provided. 3 pole contactors shall be furnished for 3 phase motors and 2-pole contactors for single phase motors. Reversing contactors shall be provided with electrical interlocks between forward and reverse contactors. If possible, mechanical interlocks shall also be provided. Contactors shall be suitable for uninterrupted duty and shall be of duty category class AC4 as defined in IS: 2959. The main contacts of the contactors shall be silver plated and the insulation class for the coils shall be class E or better. The dropout voltage of the contactors shall not exceed 70% of the rated voltage.
8. Contactors shall be provided with a three element, positive acting, ambient temperature compensated, time lagged, hand reset type thermal overload relay with adjustable setting, hand reset button shall be flush with the front door of the cabinet and suitable for resetting with starter compartment door closed.
9. Single phasing preventer relay shall be provided for 3 phase motors to provide positive protection against single phasing.
10. Mini starters shall be provided with no volt coils whenever required.
11. Purchaser's power cables will be of 1100 volts grade stranded aluminium conductor. PVC insulated, PVC sheathed single steel wire armoured and PVC jacketed. All necessary cable terminating accessories such as glands, crimp type tinned copper lugs etc. for power as well as control cables shall be included in supplier's scope of supply. Suitable brass cable glands shall be provided for cable entry.
12. Wiring for all control circuits shall be carried out with 1100 volts grade PVC insulated tinned copper stranded conductors of sizes not smaller than 2.5 sq. mm. Atleast 10% spare terminal blocks for control wire terminations shall be provided on each panel. The terminal blocks shall be of non-disconnecting stud type. All terminals shall be provided with ferrules indelibly marked or numbered and these identifications shall correspond to the designations on the relevant wiring diagrams. The terminals shall be rated for adequate capacity which shall not be less than 10 Amps.

13. Separate terminal blocks shall be provided for terminating circuits of various voltage classes. CT loads shall be terminated on a separate block and shall have provision for short circuiting the CT secondary terminals.
14. Control cabinet shall be provided with 240 V, 1-phase 50 Hz, 20 W CFL TUBE light fixture and a suitably rated 240 V, 1-phase, 5 amps, 3 pin socket for hand lamps.
15. Strip heaters shall be provided inside each cabinet complete with thermostat (preferably differential type) to prevent moisture condensation. Heaters shall be controlled by suitably rated double pole miniature Circuit Breakers.
16. Signal lamps provided shall be of neon screw type with series resistors, enclosed in bakelite body. Each signal lamp shall be provided with a fuse integrally mounted in the lamp body.
17. Electric measuring instruments shall be of moving iron type. Ammeters for measuring current upto 30 Amps shall be directly connected while those for measuring above 30 Amps shall be connected through suitable CBs. Ammeters shall be provided with selector switches.
18. Items inside the cabinet made of material shall be coated with a fungus resistant varnish.

30 MOTORS :(UNIVERSAL MOTOR)

Motors shall be universal type suitable for operation in AC & DC supply, as per IS:325 of sufficient size capable of satisfactory operation for the application and duty as required for the driven equipment.

31 TESTS

Type Tests

All the equipments offered shall be fully type tested as per the relevant standards(IEC-62271- 100,IEC-60694/IS-12729 with latest amendments) & tests as indicated below. The bids offering equipment not type tested will be rejected. In case, the equipment of the type & design offered has already been type tested, the bidder shall furnish four sets of the type test reports along with the offer. The test must have been conducted not later than five years from the date of opening of the bids. The purchaser reserves the right to demand repetition of some or all the type & additional type tests in the presence of his representative. For this purpose, the bidder may quote unit rates for carrying out such type tests. For any change in the design/type already type tested the design/type offered against this specification, the purchaser reserves the right to demand repetition of tests without any extra cost or reject the bid without any intimation.

Type Tests:--(As per IEC-62271-100 with latest amendments)

- 1) Dielectric Test(LI Voltage,PF Voltage Withstand(Dry&Wet)& etc)
- 2) RIV Test
- 3) Measurement of resistance of the main circuit
- 4) Temperature rise Test
- 5) Short Time withstand current & Peak withstand current Test
- 6) Tightness Test
- 7) Mechanical Operation Test, Mechanical endurance test 8)Short Circuit making & Breaking Test
- 9) Capacitive Current, Switching Test , Line charging current breaking Test 10)Test to verify degree of protection
- 11) EMC Test

Routine Tests:-

- 1) Dielectric Tests on the main Circuit ,auxiliary & control circuits
- 2) Measurement of resistance of the main circuit.
- 3) Tightness Test

4) Design & Visual Checks

5) Mechanical operation Test

6) Operating time of the device, motor Characteristics, measurement of coil current & resistance , Sf6 gas pressure monitoring , control Circuit , anti-pumping, dimensions, nameplate details , contact travel & timing checks & contact speed in m/sec.

The following additional type tests are proposed to be conducted. The type test charges for these tests shall be quoted along with other type tests(AS indicated above) as per IEC/ IS in the relevant schedule & the same shall be indicated in the total bid price.

1) Corona extinction voltage test (As per Annexure-I)

2) Out of phase closing tests per IEC

3) Line charging breaking current test

4) Seismic Withstand test in unpressurised condition (as per Annexure-I)

31.2 The prices quoted by the bidder towards conductance of type tests & additional type tests shall be taken in to consideration for bid evaluation.

32 TYPE, ACCEPTANCE AND ROUTINE TESTS

32.1 All acceptance and routine tests as stipulated in IEC-62271-100,IEC-60694/IS-12729, IS 13118 with its latest amendments & routine tests as indicated above shall be carried out by the supplier in the presence of purchaser's representative. Also type test on one unit may be carried out by the supplier in the presence of purchaser's representative if purchaser decides & if such facility will be available either in the manufacturer's laboratory or in the CPRI. Rates for these tests must be indicated in the Annexure-IV, V, of Section-III of this tender specification. If the manufacturer wants to do the above tests in free of cost, then he may indicate the rates as

 NIL . Purchaser reserves the right to conduct type test or may not insist for this test.

32.2 In addition to the mechanical and electrical tests specified by IEC, the following shall also be performed.

Speed curves for each breaker shall be obtained with the help of a suitable operation analyzer to determine the breaker contact movement during opening, closing, auto-reclosing and trip free operation under normal as well as limiting operating conditions (control voltage, pressure etc.). The tests shall show the speed of contacts directly at various stages of operation, travel of contacts, opening time, closing time, shortest time between separation and meeting of contacts at break/make operation etc. This test shall also be performed at site for which the necessary operation analyzer along with necessary transducers, cables, console, etc. shall be furnished as mandatory maintenance equipment.

32.3 Immediately after finalization of the program of type/acceptance/routine testing, the supplier shall give sufficient advance intimation (20 days) to the purchaser to enable him to depute his representative for witnessing the tests.

33 ADDITIONAL TESTS

The purchaser reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/laboratory or at any other recognized laboratory/research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the purchaser to satisfy that the material complies with the intent of this specification.

34 INSPECTION

34.1 The inspection may be carried out by the purchaser at any stage of manufacture. The supplier shall grant free access to purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

The supplier shall keep the purchaser informed in advance, about the manufacturing program so that arrangement can be made for inspection. Before offering for inspection, the supplier shall furnish shop routine test certificates and calibration reports of the equipment/instruments to be used during testing. After

acceptance of these calibration reports and shop routine test certificate, inspecting officer of the purchaser will be deputed for witnessing such inspections.

34.2 The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items.

34.3 No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested or unless the same is waived by the purchaser in writing.

35.0 QUALITY ASSURANCE PLAN:

The bidder shall invariably furnish following information along with his offer, failing which his offer, shall be liable for rejection.

i) Statement giving list of important raw materials including but not limited to:

(a) Contact Material

(b) Insulation

(c) Porcelain

(d) Oil

(e) Sealing material

(f) Contactor, limit switches, etc. in control cabinet.

Names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of test normally carried out on raw materials in presence of Bidder's representative, copies of test certificates.

ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.

iii) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

iv) Special features provided in the equipment to make it maintenance free.

vi) List of testing equipment available with the Bidder for final testing of breakers vis-à-vis, the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the relevant schedule i.e. schedule of deviations from specified test requirements.

vii) The supplier shall, within 30 days of placement of order, submit following information to the purchaser.

1) List of raw materials as well bought out accessories and the names of sub-suppliers selected from those furnished along with offer.

2) Type test certificates of the raw material and bought out accessories.

3) Quality assurance plan (QAP) with hold points for purchaser's inspection (if purchaser will desires).

The supplier shall submit the routine test certificates of bought out items and raw material, at the time of routine testing of the fully assembling breaker

36 DOCUMENTATION

36.1 All drawings shall conform to relevant International Standards Organization (ISO) Specification/ISS. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in S.I. Units.

36.2 List of Drawings and Documents:

The Bidder shall furnish four sets of relevant descriptive and illustrative published literature pamphlets and the following drawings/documents for preliminary study along with the offer.

a) General outline drawings showing dimensions and shipping weights, quantity of insulating media, air receiver capacity etc.

b) Sectional views showing the general constructional features of the circuit breaker including operating mechanism, arcing chambers, contacts with lifting dimensions for maintenance.

c) Schematic diagrams of breaker offered for control supervision and reclosing.

d) Structural drawing, design calculations and loading data for support structures.

- e) Foundation drilling plan and loading data for foundation design.
- f) Type test reports .

36.3 The supplier shall, within 2 weeks of placement of order submit four sets of final version of all the above drawings for purchaser's approval. The purchaser shall communicate his comments/approval on the drawings to the supplier within reasonable period. The supplier shall, if necessary, modify the drawings and resubmit four copies of the modified drawings for purchaser's approval within two weeks from the date of comments. After receipt of purchaser's approval, the supplier shall, within three weeks, submit 15 prints and one good quality reproducibles of the approved drawings for purchaser's use.

36.4 The supplier shall also furnish fifteen copies of manuals covering erection, commissioning, operation and maintenance instructions and all relevant information and approved drawings pertaining to the main equipment as well as auxiliary devices. Marked erection drawings shall identify the component parts of the equipment as shipped to enable purchaser to carry out erection with his own personnel. Each manual shall also contain one set of all the approved drawings, type test reports as well as acceptance reports of the corresponding consignment dispatched.

36.5 The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier risk.

36.6 TEST REPORTS

- i) Four copies of acceptance test reports and type test reports shall be furnished to the purchaser as per the inspection of testing. One copy will be returned, duly certified by the purchaser and only there afterwards shall the material be dispatched.
- ii) All records of routine test reports shall be maintained by the supplier at his works for periodic inspection by the purchaser.
- iii) All test reports of tests conducted during manufacture shall be maintained by the supplier. These shall be produced for verification as and when requested for by the purchaser.

37 PACKING AND FORWARDING

The equipment shall be packed in suitable crates so as to withstand handling during transit. The supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing and handling. The easily damageable materials shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by the supplier without any extra cost.

Each consignment shall be accompanied by a detailed packing list containing the following information:

- a) Name of the consignee.
- b) Details of consignment.
- c) Destination.
- d) Total weight of consignment.
- e) Sign showing upper / lower side of the crate.
- f) Handling and unpacking instructions.
- g) Bill of material indicating contents of each package and spare material.
- h) Manuals containing approved drawings & test reports

The supplier shall ensure that the packing list and bill of material are to be supplied in advance to the purchaser & to the consignees before dispatch.

38.0 SUPERVISION OF ERECTION, TESTING AND COMMISSIONING (ET&C)

The erection, testing and commissioning of the breakers shall be supervised, by trained personnel (Engineer) of the supplier who shall direct the sequence of ET&C and make the necessary adjustments to the apparatus

and correct in the field any errors or omissions in order to make the equipment and material properly perform in accordance with the intent of this specification. The Engineer shall also instruct fully (up to the satisfaction) to the plant operators, in the operation and maintenance of equipment furnished. The supplier shall be responsible for any damage to the equipment, on commissioning the same, if such damage results from faulty or improper ET&C procedure. Purchaser shall provide adequate number of skilled/semi-skilled workers as well as all ordinary tools and equipment and cranes required for breaker erection, at his own expense. Apart from the above, the purchaser shall not be responsible for any other expenses incurred by the supplier and against personal injuries to the Engineer etc., shall be to supplier's account. Special tools, if required for erection and commissioning shall be arranged by the supplier at his cost and on commissioning these shall be supplied to the purchaser, free of cost, for future use.

39 QUANTITY AND DELIVERY REQUIREMENTS

i) The scope of supply shall include a supply of 25% extra-quantity of bolts, nuts, washers, split pins, cotter pins and such other small loose items free of cost.

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