

Schedule of Supply

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1. List of Goods and Related Services

Package No. HPSDP-DoTE/EC/6, Civil Labs of Engineering College- Concrete Technology Lab, Surveying Lab, Transportation Engineering Lab and Geotechnical Lab

Delivery Address: Mahatma Gandhi Government Engineering College Kotla (Jeori), Teh- Rampur, District Shimla, Himachal Pradesh. PIN 172101

Delivery Time (in days): not more than 90

| Item No. | Name of Goods or Related Services | Unit of Measurement | Quantity | Unit Price (including GST) | Total Price (Including GST) | Remarks (Please mention Page number of detailed information brochure having make and model no. |
|---|--|---------------------|----------|----------------------------|-----------------------------|--|
| Name of Lab: Concrete Technology Lab | | | | | | |
| 1. | Sieve set for grading of fine Aggregates | No. | 2 | | | |
| 2. | Sieve set for grading of Coarse Aggregates | No. | 2 | | | |
| 3. | MS Concrete Mixing Tray | No. | 8 each | | | |
| 4. | Concrete Mixer | No. | 1 | | | |
| 5. | Longitudinal Compresso-meter for Modulus of Elasticity | No. | 1 | | | |
| 6. | Electronic Weighing Balance | No. | 1 | | | |
| 7. | Permeability Apparatus | No. | 1 | | | |
| 8. | Drying Shrinkage and moisture movement | No. | 1 | | | |
| 9. | Bulk Density, voids and Bulking | No. | 1 | | | |
| 10. | Density bucket | No. | 8 | | | |
| 11. | Crushing Value Apparatus | No. | 1 | | | |
| 12. | Vicat Apparatus | No. | 5 | | | |
| 13. | Le-Chatelier apparatus | No. | 5 | | | |
| 14. | Mould (50 mm) | No. | 18 | | | |

Equipment for Civil Labs for engineering college - Concrete Technology Lab, Surveying Lab, Transportation Engineering Lab, Geotechnical Lab
Schedule of Supply

| Item No. | Name of Goods or Related Services | Unit of Measurement | Quantity | Unit Price (including GST) | Total Price (Including GST) | Remarks (Please mention) Page number of detailed information brochure having make and model no. |
|--------------------------------|--|---------------------|----------|----------------------------|-----------------------------|---|
| 15. | Gauging Trowel | No. | 9 | | | |
| 16. | Slump Test Apparatus | No. | 6 | | | |
| 17. | Compaction Factor Apparatus | No. | 1 | | | |
| 18. | Mould (150mm) | No. | 18 | | | |
| 19. | Tamping Rod | No. | 6 | | | |
| 20. | Compression Testing Machine | No. | 1 | | | |
| 21. | Digital Compression Testing Machine | No. | 1 | | | |
| 22. | Flexural Strength Machine | No. | 1 | | | |
| 23. | Beam Mould | No. | 5 Each | | | |
| 24. | Cylindrical Mould | No. | 6 | | | |
| 25. | Laboratory Cement Autoclave | No. | 1 | | | |
| 26. | Heat of hydration apparatus | No. | 1 | | | |
| 27. | Vibrating Table | No. | 1 | | | |
| 28. | Curing Tank | No. | 1 | | | |
| 29. | Ultra Sonic Pulse Velocity (Transit time measurement) | No. | 1 | | | |
| 30. | Mould (70.6mm) | No. | 18 | | | |
| 31. | Air Permeability Apparatus (Blaine Type) with ISI Certification Mark, IS:5516 | No. | 1 | | | |
| 32. | Mortar Mixer | No. | 1 | | | |
| 33. | High Speed Stirrer | No. | 1 | | | |
| 34. | Universal Testing Machine, Computer Display Hydraulic UTM | No. | 1 | | | |
| Lab Name: Surveying Lab | | | | | | |
| 35. | Total Station with Software | No. | 5 | | | |
| 36. | Plane Table complete set with alidade, U-fork, Trough compass, hand level etc. | No. | 8 | | | |
| 37. | Optical Square | No. | 3 | | | |
| 38. | Surveyor compass | No. | 6 | | | |

| Item No. | Name of Goods or Related Services | Unit of Measurement | Quantity | Unit Price (including GST) | Total Price (Including GST) | Remarks (Please mention) Page number of detailed information brochure having make and model no. |
|--|---|---------------------|----------|----------------------------|-----------------------------|---|
| 39. | Cross staff | No. | 3 | | | |
| 40. | Theodolite | No. | 6 | | | |
| 41. | Measuring Chain | No. | 3 Each | | | |
| 42. | Ranging Rods | No. | 20 | | | |
| 43. | Pentograph | No. | 2 | | | |
| 44. | Ghat Tracer | No. | 2 | | | |
| 45. | Tangent Clinometer | No. | 2 | | | |
| 46. | Plumb bob | No. | 6 | | | |
| 47. | Arrows | Set | 4 Set | | | |
| Name of Lab:-Transportation Engineering Lab | | | | | | |
| 48. | Aggregate Impact Test | No. | 1 | | | |
| 49. | Los Angeles Abrasion Testing Machine | No. | 1 | | | |
| 50. | Dorry Abrasion Testing Machine | No. | 1 | | | |
| 51. | Deval Abrasion Testing Machine | No. | 1 | | | |
| 52. | Crushing Value Apparatus | No. | 1 | | | |
| 53. | Universal Penetrometer | No. | 1 | | | |
| 54. | Ductility Testing Machine | No. | 1 | | | |
| 55. | Rotational Viscometer | No. | 1 | | | |
| 56. | Ring and Ball Apparatus | No. | 1 | | | |
| 57. | Cleveland Flash (Open) & Fire Point Apparatus | No. | 1 | | | |
| 58. | Computerized Marshall Apparatus (digital) | No. | 1 | | | |
| 59. | Flakiness and elongation | No. | 1 | | | |
| 60. | Specific Gravity Apparatus | No. | 1 | | | |
| 61. | Hot Air Oven | No. | 2 | | | |
| 62. | IS Sieves | No. | 13 | | | |
| 63. | Hot Plate | No. | 2 | | | |
| 64. | Weighing Balance | No. | 2 | | | |
| 65. | Thermometer | No. | 2 | | | |
| 66. | Metal Tray | No. | 4 | | | |

| Item No. | Name of Goods or Related Services | Unit of Measurement | Quantity | Unit Price (including GST) | Total Price (Including GST) | Remarks (Please mention) Page number of detailed information brochure having make and model no. |
|--------------------------------------|---|---------------------|----------|----------------------------|-----------------------------|---|
| Name of Lab: Geotechnical Lab | | | | | | |
| 67. | Liquid Limit Apparatus | No. | 4 | | | |
| 68. | Plastic Limit Apparatus | No. | 4 | | | |
| 69. | Hydrometer | No. | 2 | | | |
| 70. | Pycnometer | No. | 3 | | | |
| 71. | Sieve (ISS Brass) | Set | 2 set | | | |
| 72. | Motorised Sieve Shaker | No. | 1 | | | |
| 73. | Unconfined Compressive Strength Testing Machine | No. | 1 | | | |
| 74. | Sand Pouring Cylinder (Small) | No. | 2 | | | |
| 75. | Direct Shear | No. | 1 | | | |
| 76. | Automatic Triaxial Test Apparatus | No. | 1 | | | |
| 77. | Infrared Moisture Meter | No. | 1 | | | |
| 78. | Core Cutter | No. | 2 | | | |
| 79. | Laboratory Permeability Apparatus | No. | 1 | | | |
| 80. | Standard Proctor Compaction | No. | 1 | | | |
| 81. | Computerized California Bearing Ratio Machine | No. | 1 | | | |
| 82. | Hot Air Oven | No. | 1 | | | |
| 83. | Digital Analytical Balance | No. | 2 | | | |
| 84. | Metal Tray | No. | 4 | | | |

Note: Manufacturing certificate or Manufacturer authorization certificate to be submitted with quotations. Attach a brochure with actual photo and technical details about the item of equipment.

2. Delivery and Completion Schedule

The delivery period shall start as of date of Signing the Contract

| Item No | Description of Goods or Related Services | Delivery Schedule (Duration) | Location | Required Arrival Date of Goods or Completion Date for Related Services |
|---------------|--|--|---|--|
| Item No. 1-84 | As per Schedule 1 – List of Goods and Related Services | Within 90 Days from the Signing of the contract. | Mahatma Gandhi Govt. Engineering College Kotla (Jeri), Tehsil- Rampur, District –Shimla, Himachal Pradesh. PIN 172101 | Within 90 Days from the Signing of the contract. |

3. Technical Specifications

Package No. HPSDP-DoTE/EC/6, Civil Labs of Engineering College- Concrete Technology Lab, Surveying Lab, Transportation Engineering Lab and Geotechnical Lab

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|---|--|--|----------|-------------|-------------|---|---|------------------------------|
| Name of Lab:-Concrete Technology Lab | | | | | | | | |
| 1. | Sieve set for grading of fine Aggregates | Specification: 600, 300, 150, 90, 75 (Micron), & 1.18, 2.36, 4.75, 10 (mm) for grading of fine & lid pan | | | | | | 3 Years |
| 2. | Sieve set for grading of Coarse Aggregates | Specification:80mm, 63mm, 50mm, 40mm, 25mm, 20mm, 12.5mm, 10mm, 6.3mm IS sieve for grading of coarse aggregates & lid-pan | | | | | | 3 Years |
| 3. | MS Concrete Mixing Tray | 4' × 3.5' MS Tray 3.5' × 3.5' MS Tray | | | | | | 3 Years |
| 4. | Concrete Mixer | Specifications: The mixer should consist of a steel vessel of 100 litres capacity, mounted on a frame. The vessel should be able to rotate at 20-24 RPM with the help of a motor and a reduction gear. Drum Type | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 5. | Longitudinal Compresso-meter for Modulus of Elasticity | Ref:ASTM-C469 This apparatus is to be used for determination of the strain and deformation characteristics of cement concrete cylindrical specimens of 150 mm dia x 300 mm length. The Compresso-meter should consist of two frames for clamping to the specimen by means of five tightening screws with hardened and tapered ends. Two spacers should able to hold the two frames in position. The apparatus has to be | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|--|------------------------------|
| | | provided with an adjustable pivot rod rests on pivot screws & Dial gauge 0.002mm x5mm. | | | | | | |
| 6. | Electronic Weighing Balance | Specification: 300 KG Weighing Balance to weigh the materials in the Concrete Lab with Pan size of 600 x 600 mm. Least count for the measurement of same is 50g. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 7. | Permeability Apparatus | IS: 3085 And US bureau of reclamation. Specification: The Permeability test is carried out as per the standard IS: 3085 three cell model, cylindrical specimen of 150mm dia x 150 mm height. High Pressure Permeability Test can be conducted on concrete specimens using different cells. Each cell has to be made up of steel and provided with a top plate and funnel at the bottom having gasket seals held in position through bolts and nuts. The concrete specimens have to be sealed in the cells to prevent any leakage along the side walls. Provision has to be made to collect permeable water in glass bottles attached at the bottom. Each test cell should have its own control valves. Further, the controls valves have to be mounted on a sturdy welded structural stand. All multi-units are to be provided with end pressure gauges. Beside this, each unit has to be provided with chamber pressure gauges of 21 kg/cm sq. and test pressure gauge of 17.5kg/cm.sq. To be supplied with 3HP double stage air | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|--|---|----------|-------------|-------------|---|--|------------------------------|
| | | compressor for applying pressure up to 15kg/cm ² and specimen casting mould. | | | | | | |
| 8. | Drying Shrinkage and moisture movement | <p>IS : 4031, IS 9459 , ASTM- C490</p> <p>The apparatus will be used for the determination of change in size of concrete or cement sample, brought about by a change in moisture content. Test can be performed on freshly made specimens or specimen taken from existing structure. The apparatus should be used to find out the length and volume change. It should consists the followings:</p> <p>1)Length comparator apparatus – Apparatus has to be used to find out the initial drying shrinkage, drying shrinkage and moisture movement. The equipment should be provided with the following replaceable parts:- Length comparator frame Reference bar Digital dial gauge reading to 0.001mm is fixed at top. An adjustable cross plate is fitted at the top.</p> <p>2) Volume change apparatus- This apparatus is to be used for determining the volume change of cement / concrete. The apparatus should consists of a mould 100 x 100 x 250 mm effective gauge length (Distance between the inner most points of the reference points) complete with base plate and four reference points of standard length. The equipment has to be supplied complete with Length Comparator.</p> | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 9. | Bulk Density, voids and | <p>Ref. slandered: IS 1199, IS 10079, BS :1881</p> <p>The apparatus will be used to determine the</p> | | | | | Installation shall be in scope of supplier | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|--|------------------------------|
| | Bulking | unit weight of aggregates and voids in between aggregate. The Cylindrical metal measures with ISI Certification mark IS-2385 (Part 3) consists of one each of the following measures: 3 litres,15 litres, 30 litres and supply complete with tamping rod of 16 mm dia x 60 cm long have to be provided. | | | | | without any cost. Further, installation also include the material required for installation | |
| 10. | Density bucket | Ref. slandered: 2386 Part 3 Ruggedly constructed from galvanised wire mesh with handle, Size 20 cm dia x20 cm high. | | | | | | 3 Years |
| 11. | Crushing Value Apparatus | Ref std: IS 2386 (Part IV) Crushing value apparatus will be used for measuring the resistance of an aggregate to crushing as per IS 2386 (part 4). The equipment should consists of following parts:- M.S Cylindrical container, plunger, base plate, tamping rod of circular cross-section 16mm diameter and 60 cm long, rounded at one end, M.S Cylindrical container 150mm± 0.5mm dia x 130mm to 140 mm high. Base plate 200 to 230 mm square x 6mm thick, Plunger of 148mm ± 0.5 mm dia x 100 to 115 mm high. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 12. | Vicat Apparatus | Vicat Apparatus, with ISI Certification Mark, IS:5513 It should contain Vicat Mould, Glass Base Plate, Initial Needle (in Plastic Case), Final Needle (in Plastic Case), Consistency Plunger (in Plastic Case), Mild Steel Base Plate, Vicat Mould Split Type, with Clamping Ring | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 13. | Le-Chatelier apparatus | Le-Chatelier Mould with ISI Certification Mark Extensibility of Mould Apparatus (Resistance | | | | Catalogue/ Instructional manual/ | Installation shall be in scope of supplier without any cost. | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|--|------------------------------|
| | | of Mould Test Apparatus) Le-Chatelier Flask | | | | Wall Chart | Further, installation also include the material required for installation | |
| 14. | Mould (50 mm) | Mould frame , Cast Iron for 50 mm Cube with ISI Certification Mark as per IS:10086, the mould frame should be able to cast 3 moulds at one time. | | | | | | 3 Years |
| 15. | Gauging Trowel | Gauging Trowel Ref. Standard - IS:4031 100 to 150 mm long blade with straight edge. Weight $210 \pm 10g$ | | | | | | 3 Years |
| 16. | Slump Test Apparatus | To be supplied complete, Slump Cone with the base plate, having cleats and swivel handle and Tamping Rod of 16 mm dia x 60cm long, The equipment should have ISI Certification Mark (IS:10086).Bottom diameter:20cm, top diameter:10cm, Height:30 cm. | | | | Catalogue/ Instructional manual/ Wall Chart | | 3 Years |
| 17. | Compaction Factor Apparatus | Compaction Factor Apparatus should be complete with hoppers and receiver assembly, Tamping Rod of 16 mm dia x 60 cm long having a Hooper and two trowels. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 18. | Mould (150mm) | Cast Iron, 150 mm sized cube with ISI Certification Mark | | | | | | 3 Years |
| 19. | Tamping Rod | Tamping Rod, Steel, 16 mm dia x 600 mm length rounded at the lower end. The tamping rod should carry ISI Certification Mark IS:10086 Tamping Bar, Steel, 25 mm x 25 mm square ramming face, 400 mm long, 2kg in | | | | | | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-------------------------------------|---|----------|-------------|-------------|---|--|------------------------------|
| | | weight. The tamping rod should carry ISI Certification Mark IS:10086. | | | | | | |
| 20. | Compression Testing Machine | Capacity : 1000kN, LC : 5 KN Maximum Clearance Between Platens: 390mm Maximum distance between side plates: 260mm Platen Size : Dia 222mm Piston Dia : 157mm Piston Stroke: 50 mm 1000kN, Electrical operated (220 V) Compression Testing Machines conform to IS: 14858(2000) and calibrated with an accuracy of $\pm 2\%$ as per the requirement of 1828(Class1). Suitable for testing cubes and cylinders of various sizes. It should be certified from NABL/ILAC/Govt Labs. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGSEC. | 3 Years |
| 21. | Digital Compression Testing Machine | Ref : IS-516, IS - 14858 Capacity 2000kN Loading Unit: The loading unit should be of fully welded construction having a cross head, base and solid side plates. A hydraulic jack should be fixed to the base. The platens of the machine are to hardened, ground and polished. The upper platen is to be provided with the self-aligning action. Further, to facilitate testing of various sizes of Specimens, suitable size spacers are to be provided. Pumping Unit :The two speed pump which facilitates rapid approach of the platens for daylight closure are to be provided The equipment should contain a control knob | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGSEC campus. | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|--|------------------------------|
| | | <p>so as to manually control the loading rate for the accuracy of pacing. A digital read-out unit, which incorporates a 4-digit display, calibrated in kN with features integral load pacing in kN/Sec are to be provided.</p> <p>The equipment should be able to held and retained the maximum load for approx 15 min, unless if not cancelled.</p> <p>The pace rate set for running the test should be able to be maintained manually with the help of a bar graph indicator. The equipment should have the logged data printing facility through a parallel port and readings upto2000 complete runs/tests, which are stored in the memory.</p> <p>It should be certified from NABL/ILAC/Govt Labs.</p> | | | | | | |
| 22. | Flexural Strength Machine | <p>Ref : IS 516, BS- 1881 and ASTM C78</p> <p>A spacer is to be provided for testing different size of beams. The load is to be indicated on the calibrated bourdon tube type load gauge of range: 0 -100 kN x 0.5 kN.Rugged high strength frame,Double action hydraulic pump, Self-aligning roller assembly, Hydraulic jack provided with retraction spring, equipment should be able to test beams of size 100X100X500mmand 150X150X 700mm Suitable for operation on 220V, 50Hz, Single Phase,AC supply</p> <p>It should be certified from NABL/ILAC/Govt Labs.</p> | | | | Catalogue/ Instructional manual/ Wall Chart | <p>Installation shall be in scope of supplier without any cost.</p> <p>Further, installation also include the material required for installation.</p> <p>The Bidder will also provide minimum 1-2 week hands on training at MGEC campus.</p> | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts | | | | | | | | | | | | | | |
|----------|-----------------------------------|--|----------|-------------|-------------|---|---|------------------------------|-----|-------------------|--|--|--|--|--|--|---------|-----|-----------------------------|--|--|--|
| 23. | Beam Mould | Beam Mould 100 mm x 100 mm x 500 mm size | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years | | | | | | | | | | | | | | |
| | | Beam Mould 150 mm x 150 mm x 700 mm size | | | | | | | 24. | Cylindrical Mould | Cylindrical Mould , Cast Iron, Split length wise 150 mm x 300 mm high with <ul style="list-style-type: none"> • ISI certification mark IS:10086 | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years | 25. | Laboratory Cement Autoclave | <ul style="list-style-type: none"> • Working Pressure : $21 \pm 1\text{kg} / \text{cm}^2$ at 215°C • Pressure Vessel: ID 150 mm×Depth500 mm • Weight(Approx.) : 70 Kg • Heater : 2000 Watts • Supply : 220V, 50Hz, 1 phase • (110V, 60Hz Models are available • The following accessories are required to be included in the Digital Autoclaves for inbuilt safety measures. • Temperature Controller for temperature range 537.7 C • set up to 218 C with accuracy 0.1 C. Temperature • Controlled within $+1 \text{ C}$. • Pressure Indicator-cum-Controller: This indicates the pressure up to 21 bar& after that it works as a controller& cut off the power | | |
| 24. | Cylindrical Mould | Cylindrical Mould , Cast Iron, Split length wise 150 mm x 300 mm high with <ul style="list-style-type: none"> • ISI certification mark IS:10086 | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years | | | | | | | | | | | | | | |
| 25. | Laboratory Cement Autoclave | <ul style="list-style-type: none"> • Working Pressure : $21 \pm 1\text{kg} / \text{cm}^2$ at 215°C • Pressure Vessel: ID 150 mm×Depth500 mm • Weight(Approx.) : 70 Kg • Heater : 2000 Watts • Supply : 220V, 50Hz, 1 phase • (110V, 60Hz Models are available • The following accessories are required to be included in the Digital Autoclaves for inbuilt safety measures. • Temperature Controller for temperature range 537.7 C • set up to 218 C with accuracy 0.1 C. Temperature • Controlled within $+1 \text{ C}$. • Pressure Indicator-cum-Controller: This indicates the pressure up to 21 bar& after that it works as a controller& cut off the power | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGEC campus. | 3 Years | | | | | | | | | | | | | | |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|---|------------------------------|
| | | <p>supply at 23 bar.</p> <ul style="list-style-type: none"> • Pressure Indicator supplied has capacity of 25 bar, • resolution 0.1 bar. • Safety Valve supplied is to be set at 24 bar. • If temperature controller as well as the indicator fails then Pressure Releases at 24 bar. | | | | | | |
| 26. | Heat of hydration apparatus | <p>The machine should have constant-speed stirrer maintains uniform temperature throughout liquid and should have sufficient agitation to keep solid reactant suspended in the acid mixture. The equipment should consist of insulated wood case, vacuum jar with stopper; thermometer plus holder, glass funnel; stirring paddle and chuck.</p> <p>IS 4031 part 9, IS 11262:1995</p> | | | | Catalogue/ Instructional manual/ Wall Chart | <p>Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation</p> | 3 Years |
| 27. | Vibrating Table | <p>The equipment should have vibro motor and AC drive Arrangement so as to have the frequency to be varied steplessly between 60 Cycles/ sec and 43 Cycles/sec. operation on 220 V, 50 Hz, Single Phase, Vibrating Table size 2m x 1m.</p> | | | | | <p>Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation</p> | 3 Years |
| 28. | Curing Tank | <p>Curing Tank for 6/12 cubes of 150 mm/ 70.6 mm size 24-hour cycle from time of mixing.</p> <ul style="list-style-type: none"> • Temperature range : Ambient + 5°C to 95 to 100°C Curing Temperature for Concrete in lab environment for 0 Temperature range - 23+ 2 C & Relative humidity - 50 + 10% and should be fully insulated, complete with a hinged lid, heater, thermostat and recirculation pump. | | | | Catalogue/ Instructional manual/ Wall Chart | <p>Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation</p> | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|---|---|----------|-------------|-------------|---|--|------------------------------|
| | | Provision of two removable racks allowing free circulation of water around each cube. The pump, drain valves and electrical equipment are housed in a compartment located at one end of the tank. | | | | | | |
| 29. | Ultra Sonic Pulse Velocity | <p>Ultrasonic pulse velocity tester</p> <p>Time measuring from 0 to 9999,9 μS</p> <p>Resolution: 0, 1 μS</p> <p>The standard appliance includes:</p> <p>¼ VGA colour touch screen,</p> <ul style="list-style-type: none"> • Two between 50 -60 kHz probes with connecting cables. • Calibrating cylinder and contact paste • Strong anti shock case holding the instrument and the accessories. • Battery pack Li-Ion 11,1V 3000mA.h • External feeder 230V/24V and battery charger • Weight : 3 kg Approx | | | | Catalogue/ Instructional manual/ Wall Chart | The Bidder will also provide minimum 1-2 week hands on training at MGEC campus. | 3 Years |
| 30. | Mould | Mould, Steel, for 70.6 mm Cube with ISI Certification Mark as per IS:10080 | | | | | Installation shall be in scope of supplier without any cost and it also include material required for installation | 3 Years |
| 31. | Air Permeability Apparatus (Blaine Type) with ISI Certification Mark, IS:5516 | <p>The apparatus should consists of</p> <ol style="list-style-type: none"> 1.Permeability Cell 2. 'U' Tube Manometer, mounted on stand. 3. Perforated Metal Disc. 4. Plunger. 5. Rubber Stopper. 6. Rubber Tube, 20 cm long. 7. Filter Paper Discs (Twelve Nos.). | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|---|--|----------|---|-------------|---|---|------------------------------|
| | | 8. Dibutylphthalate Liquid, 100 ml bottle. 9. Punch. 10. Non Perforated Disc. 11. Suction Bulb. | | | | | | |
| 32. | Mortar Mixer | The mixed should have timer Facility available. It should have the Auto function to carry out the test Automatically. Sand disposal to be done automatically The mixed should be of stainless steel mixing bowl with a capacity of 4.75 litres. The paddle, made of stainless steel, should have both planetary and revolving motion for uniform mixing. Suitable for operation on 415V, Three phase, 50Hz AC supply. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 33. | High Speed Stirrer | The stirrer should be suitable for operation on 220 V, 50 Hz, single phase, AC Supply. Should be supplied with Dispersion Cup, Baffler | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 34. | Universal Testing Machine, Computer Display Hydraulic UTM | Max test force: 1000 kN Test Machine Class: 1 class Load Accuracy: $\leq \pm 0.5\%$ Load Range: 2%-100% FS Deformation Measurement Range: 2%~100%FS Deformation accuracy: $\leq \pm 1\%$ Displacement Resolution (mm): 0.01 Displacement Error : $\leq \pm 0.5\%$ Beam adjust speed: 150 mm/min Piston stroke: 200 mm | | 1. Shear Test Attachment 2. Flexure Test Attachment 3. Brinell Hardness Test Attachment | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|--------------------------------|-----------------------------------|---|----------|--|-------------|---|---|------------------------------|
| | | Min. tensile space: 500 mm Min. compression space: 450 mm Column distance: 560 mm Sample clamp mode: Hydraulic auto clamp Clamping diameter of round sample (mm): $\Phi 06-13, \Phi 13-26, \Phi 26-45$ Clamping thickness of flat sample (mm): 0-20 Bending attachment: three-point bending attachment Compression attachment diameter: 160 mm Machine size (mm)(Approx.):820x660x2250 Power supply: 220V/60Hz/3ph Structure: four columns, two screws, chain transmission, oil cylinder underneath | | 4. Bend – Rebind Test Attachment | | | hands on training at MGGECC campus. | |
| Lab Name: Surveying Lab | | | | | | | | |
| 35. | Total Station with Software | Telescope: Magnification- 30x Image-Erect Field of view-1° 30' Minimum Minimum focusing distance- 1.5 m or less Laser Pointer- Red Light, Coaxial Angle Measurement: Standard deviation for Horizontal & Vertical angle- 2" or better Least Count- 1 sec Compensator: Type - Electronic, Dual-axis Compensation Range/Accuracy $\pm 3.0' / 1''$ Distance Measurement: With Reflector - 5.0 Km or more Without Prism: 1000 m or more Accuracy: $\pm / - (2 \text{ mm} + 2 \text{ ppm})$ (With Reflector) or better | | Accessories with each TS: (i) Universal telescopic tripod wooden stand=1 Nos. (ii) Telescopic Pole for pris = 1 Nos. (iii) Single prism with holder and target plate | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGGECC campus. | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|--|---|----------|---|-------------|-----------|--|------------------------------|
| | | <p>+/- (3mm + 2ppm) (Without Reflector) or better</p> <p>Plummet for Centring: Centring device: Laser/Optical Plummet with accuracy of 1mm Measurement Time: Standard Mode/Prism: 0.3/0.5/1.0 sec (Tracking/Fast/Fine) Reflector less: 0.3-3sec Data Storage: Internal Memory: 80000 points or more for data storage (Internal Memory) & total with 4GB or more storage On Board Software: Windows/Linux - Based Battery: (a) Type: Lithium-ion batteries. b) Operating time (Angle + distance meas.): 15 hours or more Display & Keyboard: 2.8 inch, 240*320 pixel highlight color display. 2 sides alphanumeric backlit silicon keyboard, Trigger Key. Import and Export: Can Import and Export CSV, CAD, LandXML and Shapefile Working temperature range 10 degree C to 50 degree C or better, Dust/water rating IP 55 or better.</p> | | <p>= 1 Nos. (iv) Internal battery = 2 Nos. (v) Dual Battery charger = 1 No. (vi) Tribrach without optical plummet = 1 Nos. and other required accessories.</p> | | | | |
| 36. | Plane Table complete set with alidade, U-fork, Trough compass, hand level etc. | 750mm X 600 X 22 mm made of seasoned fire wood, fitted with brass screws and brass washers, provided with metal head wooden stand and water proof cover, and complete with all accessories, As Per IS Specification No. IS-2539-1963. IS-2539-1963. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
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| 37. | Optical Square | Consists of Brass / suitable metal hollow box having open face about 6 x 3 cms and closed face about 2 x 3 cm. and deep about 4cm to 5cm. provided with a brass handle about 8cm. in length. Two mirrors fixed at an angle of 45 degree to the inclined sides of the box. Circular type made up of brass & fitted with double reflecting mirror right & left to 90, in case. | | | | | Installation shall be in scope of supplier without any cost. Further installation also include the material required for installation | 3 Years |
| 38. | Surveyor compass | Made of Brass, Size 100mm dia. with metal circle graduated to full degree with two bubble and with bar needle fitted with real agate stone to give high accuracy precision bearing reading | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 39. | Cross staff | Size 4", Open Type having four vanes at right angles, Complete in wooden box with metallic Pole. | | | | | | 3 Years |
| 40. | Theodolite | Image: Erect, Length:178 mm, Magnification:30X , Effective Aperture: 40mm, Field of View: 2.6 M at 100M, Short Focus:1.5M,Stadia Ratio: 1:100, Stadia Constant: 0 Resolving: 4", Power Circle Diameter: Hz113mm, V100 mm, Graduation: 20' Vernier Reading: 20", Plate Level Sensitivity: 45" / 2mm, Vertical Circle Level: 1' / 2mm | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 41. | Measuring chain | Links of chain are to be made up of galvanized mild steel wire of 4 mm diameter. Brass handles should contain swivel joints, as per the IS 1492-1970. (a) 20 meter length, (b) 30 meter length | | | | | | 3 Years |

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| 42. | Ranging Rods | 3 m (collapsible) circular with 3 to 5 cm diameter made up of metal conduit with conical metallic shoe fitted at bottom & fully painted with 20 cm long colour bands of either of the Black& White combination or Red & White. | | | | | | 3 Years |
| 43. | Pentagraph | Size 42" Most improved pattern. Made of semi-brass & semi-aluminium, with metal fittings, with castors clamps, perpendicular socket with tracing point, pencil holder and fulcrum pin with scale of proportion, engraved on arm. Packed in well polished wooden box. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 44. | Ghat Tracer | With pole and target. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 45. | Tangent Clinometer | Indian pattern | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 46. | Plumb bob | Should be made up of brass and should have shape of pear. The plumb bob should have a provision of hook at the top. | | | | | | 3 Years |
| 47. | Arrows | Loop at one end, other end is pointed but slightly rounded, the length of the arrow should be 40cm set of arrows should contain 10 arrows | | | | | | 3 Years |

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|--|--------------------------------------|--|----------|-------------|-------------|---|--|------------------------------|
| Name of Lab:-Transportation Engineering Lab | | | | | | | | |
| 48. | Aggregate Impact Test | The instrument is used for determining the Impact Value of coarse aggregate. The instrument should consists of the following:- i) A heavy circular base with two vertical guides fitted with a cross bar at the top. ii) A hammer of 13.75 kg mass which can be raised and allowed to fall freely through 380 + 5 mm with locking arrangement. iii) A cylindrical cup, a metal measure and a tamping rod 10 mm dia x 230 mm long | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 49. | Los Angeles Abrasion Testing Machine | Ref:-IS : 10070 Instrument will be used for estimation of abrasion value of coarse aggregate. The machine should comprises the following:- i) A hollow steel cylinder mounted on a sturdy frame on ball bearings capable of rotating about its axis in a horizontal position. ii) A motor with reduction gear which runs the drum at 30-33 rpm. iii) A tray. iv) A revolution counter. v) Abrasive charge consisting of 12 steel ball approximately 48 mm dia and each weighing between 390 and 445 g. The equipment suitable be suitable for operation on 220/440 v, 50 Hz, 3 phase supply. A detachable shelf fitted inside the cylinder. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGSEC campus. | 3 Years |
| 50. | Dorry Abrasion | The instrument will be used for determination of the resistance of aggregates to surface wear | | | | Catalogue/ Instructional | Installation shall be in scope of supplier | 3 Years |

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|----------|-----------------------------------|--|----------|-------------|-------------|---|---|------------------------------|
| | Testing Machine | by abrasion. The apparatus should comprises the following:- i) A circular disc mounted on a reduction gear driven by an electric motor at about 28-30 rpm. ii) Two large trays for holding the sample. iii) Two small trays for sample. iv) Two conical hoppers for sand. v) Two sample try holders. vi) Two sets of weights for loading the samples. vii) A revolution counter. Suitable for operation on 220 V, 50 Hz, single phase supply. | | | | manual/ Wall Chart | without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGGECC campus. | |
| 51. | Deval Abrasion Testing Machine | Ref :IS 2386 PART 4 , ASTM C- 131 The instrument will be used for determining the abrasion value of coarse aggregate. It should consists of the following:- i) Two hollow cast iron cylinders closed at one end and fitted with tightly fitting covers at the other and mounted on a shaft at an angle of 30 degree to the axis of the shaft. The cylinders size should be of 20 cm internal diameter and 34 cm deep. ii) A shaft adjusted to rotate at 30-33 rpm by reduction gear mechanism operated by a motor. iii) A revolution counter. Suitable for operation on 440 V, 50 Hz, 3 phase supply. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGGECC campus. | 3 Years |
| 52. | Crushing Value Apparatus | Ref :IS 9376 The instrument will be used for determining the Aggregate Crushing Value as per IS:2386 part 4 | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|---|------------------------------|
| | | <p>i) A 15-cm diameter open-ended steel cylinder, with plunger and base-plate, of the general form and dimensions shown in Fig. 1. The surfaces in contact with the aggregate shall be machined and case-hardened or otherwise treated so as to have a diamond (VI-I) pyramid hardness number of not less than 650 VII.</p> <p>ii) A straight metal tamping rod of circular cross-section 16 mm in diameter and 45 to 60 cm long, rounded at one end.</p> <p>iii) A balance of capacity 3 kg, readable and accurate to one gram.</p> <p>iv) For measuring the sample, cylindrical metal measure of sufficient rigidity to retain its form under rough usage and of the following internal dimensions: Diameter 11.5 cm, Height 18cm</p> | | | | | also include the material required for installation | |
| 53. | Universal Penetrometer | <p>The instrument will be used for determining the penetration value of bitumen.</p> <p>The instrument should have the automatic timer supplies (at 220 V, D.C. output) for exactly 5 seconds to a timing head (built in electromagnet). The timer head should allow the plunger rod to fall freely for 5 seconds and clamps it automatically after 5 seconds.</p> | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 54. | Ductility Testing Machine | <p>The instrument will be used for determining the ductility of asphaltic bitumen, native asphalt, cut back bitumen and blown type bitumen.</p> <p>i) Mould-made of brass with shape, dimensions and tolerances. The dimensions of the mould shall be such that when properly assembled, it will form a briquette specimen having the</p> | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
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| | | <p>following dimensions: Total length 75.0 ± 0.5 mm Distance between clips 30.0 ± 0.3 mm Width at mouth of clip 20.0 ± 0.2 mm Width at minimum cross-section 10.0 ± 0.1 mm (halfway between clips) Thickness throughout 10.0 ± 0.1 mm</p> <p>ii) Water Bath - A bath preferably with a thermostat maintained within $\pm 0.1^\circ\text{C}$ of the specified test temperature, containing not less than 10 litres of water, the specimen being immersed to a depth of not less than 100 mm and supported on a perforated shelf not less than 50 mm from the bottom of the bath.</p> <p>iii) Testing Machine - For pulling the briquette of bituminous material apart, any apparatus may be used which is so constructed that the specimen will be continuously immersed in water, while the two clips are pulled apart horizontally with minimum vibrations at a uniform speed, as specified and with suitable arrangement for stirring the water for attaining uniformity in temperature</p> <p>iv) Thermometer - conforming to the following requirements: Range 0 to 44°C Graduations 0.2°C Immersion 65 mm Overall length 340 ± 10 mm Stem diameter 5.5 to 8.0 mm Bulb length 10 to 16 mm Bulb diameter Not larger than stem diameter Length of graduated portion 150 to 190 mm Longer lines at each 1°C and 5°C</p> | | | | | <p>The Bidder will also provide minimum 1-2 week hands on training at MGCEC campus.</p> | |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
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| | | Figured at each 5°e Scale $\pm 0.2^{\circ}\text{C}$ As per IS Standards IS:1208, ASTM D113, AASHTO T 51 | | | | | | |
| 55. | Rotational Viscometer | As per ASTM D4402 & BIS 73 <ul style="list-style-type: none"> • Rotational speed: 0 to 1000 rpm or Suitable for Test as per code. • Shear rate 1/s, s-1 4-1, 200 • Torque range 0 – 10 mNm. • Shear Stress pa 8-1, 500 • Viscosity pas 0.006 to 350 • Heater Temperature range: - Ambient to 300°C • Data transfer through RS232/USB • Power Consumption low power 4W Complete with C25 titanium bob stainless steel cup. Suitable for operation on 230 V, 50 Hz, single phase, AC supply. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGCEC campus. | 3 Years |
| 56. | Ring and Ball Apparatus | Ring and Ball Apparatus The determining the softening point of bitumen. The apparatus should consists of two steel balls (9.5 mm dia), two tapered rings in brass, two ball centring guides, a ring holder and a bath 8.5 cm dia x 12 cm deep (Semi-Automatic) | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 57. | Cleveland Flash (Open) & Fire Point Apparatus | Cleveland Flash (Open) & Fire Point Apparatus Instrument will be used for determination of the flash & fire points of petroleum products except oils and products having an open cup flash below 175 degree F. It should have a Cleveland flash-cup in brass with an insulated handle, a metal heating plate | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
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| | | with a circular opening covered by asbestos board, an electric heater with energy regulator, and a gas test jet assembly. Suitable for operation on 220V, 50 Hz, Single Phase supply. | | | | | | |
| 58. | Computerised Marshall Apparatus (digital) | <ul style="list-style-type: none"> The Automatic digital Marshall testing apparatus should comply with ASTM D 5581:2007, ASTM D 1559, ASTM D 6927-06, BS 598-197and EN 12697-34., The test apparatus should have a load frame of 100 KN capacity, single speed, robust design for carrying out digital and modified marshall stability test for 4" and 6" dia sample, Digital indicator for digital display of test results. The Platen movement in the load frame should be easy and user friendly, The load frame should have vertical clearance more than 420 mm and maximum horizontal clearance more than 250 mm with platen diameter in the range of 50-500 mm. The Equipment to be provided with Data Acquisition System and relevant software. Load cell and LVDT. With NABL/ILAC/Govt. Lab calibration of load cell | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGCEC campus. | 3 Years |
| 59. | Flakiness and elongation | The particle shape of aggregates is determined by the percentages of flaky and elongated particles contained in it. Requirement : A standard thickness gauge & A standard length gauge As per IS:2386(PartI)-1963 | | | | | Installation shall be in scope of supplier without any cost and it include the material required for installation | 3 Years |

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| 60. | Specific Gravity Apparatus | Apparatus – (buoyancy balance and density basket) The apparatus shall consist of the following: Balance -A balance or scale of capacity not less than 3 kg, readable and accurate to 0.5 g and of such a type and shape as to permit the basket containing the sample to be suspended from the beam and weighed in water. Oven-A well ventilated oven, thermostatically controlled, to maintain a temperature of 100 to 110%. A wire basket of not more than 6.3 mm mesh or a perforated container of convenient size, preferably chromium plated and polished, with wire hangers not thicker than one mm for suspending it from the balance. A stout watertight container in which the basket may be freely suspended. Two dry soft absorbent cloths each not less than 75 x 45 cm. A shallow tray of area not less than 650 cms. An airtight container of capacity similar to that of the basket. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 61. | Hot Air Oven | Hot air Oven (with max temperature 250 °C) Capacity :1000kg No. of trays : 4 | | | | | Installation shall be in scope of supplier without any cost and it include the material required for installation | 3 Years |
| 62. | IS Sieves | IS sieves set both for fine and coarse aggregate For fine aggregate- 4.75mm, 2.36mm, 1.18mm, 600 microns, 300 microns, 150 microns & 75 microns. For coarse aggregate – 25mm,20mm 12.5mm,13mm, 10mm, 4.75mm. | | | | | | 3 Years |

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| 63. | Hot Plate | Hot plate (temperature monitor Constant temperature within $\pm 10^{\circ}\text{C}$ - Platform temperature different within 1-2 $^{\circ}\text{C}$) | | | | | | 3 Years |
| 64. | Weighing Balance | Weighing balance (capacity 50kg,accuracy 5gm) & (capacity 10kg,accuracy 1gm) | | | | | Installation shall be in scope of supplier without any cost and it include the material required for installation | 3 Years |
| 65. | Thermometer | Thermometer Digital thermometer Temp range :- -50 'C + 300 'C ,accuracy +/- 1 $^{\circ}\text{C}$ | | | | | | 3 Years |
| 66. | Metal Tray | Sized 30 x 30 x 4 cmx cm x cm, non corrodable surface, painted | | | | | | 3 Years |
| Name of Lab:- Geotechnical Lab | | | | | | | | |
| 67. | Liquid Limit Apparatus | IS 2720 PART 5 This apparatus is used to find out the liquid limit of the soil sample. The instrument should consist of a hard rubber base carrying a sliding carriage. The whole assembly should be fixed with a hinged brass cup. Further the cup should be able to be raised or to fall through a height of 1 cm on the hard rubber base, with the help of a lead screw provided at the back of the sliding carriage. The instrument has to be supplied complete with Casagrande Grooving Tool and Gauge Block (Type A of IS: 9259). The equipment should have motorized operation through 50 Hz A.C. supply. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |

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|----------|-----------------------------------|---|----------|-------------|-------------|---|--|------------------------------|
| 68. | Plastic Limit Apparatus | This will be used to find out the Plastic limit of the soil sample. Plastic limit set comprising of glass plate, Brass Rod, Spatula, Moisture Tin & Porcelain Dish. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 69. | Hydrometer | Fine grain analysis The scale on the hydrometer is to vary from 0.995 to 1.030 as per IS: 2720(Part-IV). The hydrometer should consist of hydrometer glass jar marked 1000 ml glass cylinder without pour out, which can be used to prepare the soil suspension. The apparatus should be supplied with the rubber bung. | | | | Catalogue/ Instructional manual/ Wall Chart | | 3 Years |
| 70. | Pycnometer | To determine specific gravity of fine grain soil The pycnometer should have capacity of 1 kg Glass Jar with Brass Cone, Locking Ring and Rubber Seal. | | | | | | 3 Years |
| 71. | Sieve (ISS Brass) | For sieve analysis 20 cm diameter. 10.00 mm 5.60 mm 4.75 mm 4.00 mm 3.35 mm 2.80 mm 2.36 mm 2.00 mm 1.70 mm 1.60 mm 1.40 mm 1.18 mm 1.00 mm 850 microns 710 microns 600 microns 500 microns 425 microns 355 microns, 300 microns, 250 microns, 212 microns,180 microns,160 microns,150 microns,125 microns,106 microns,90 microns,80 microns,75 microns,63 microns,53 microns, 45 microns,38 microns, Pan & Cover | | | | | | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|---|---|----------|-------------|-------------|---|---|------------------------------|
| 72. | Motorised Sieve Shaker | The instrument should have a digital timer adjustable from 0-99 minutes. The Sieve Shaker should be able to carry up to 8 sieves and should be able to be driven by a ¼ HP geared motor. The Sieve Table should changes progressively in the clockwise direction. In addition to the gyratory motion of the table, there should be tapping motion for better sieving action. The equipment should be suitable for the operation on 220 V, 50 Hz, Single Phase, AC supply, and to be supplied with Adaptor to hold 8 sieves of 20cm dia. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 73. | Unconfined Compressive Strength Testing Machine | Determination of unconfined compressive strength i) Compression Device The compression device may be any of the following types: a) Platform weighing scale equipped with a screw-jack activated yoke; b) Hydraulic loading device; c) Screw jack with a proving ring; and d) Any other loading device. ii) Proving Ring Least count 1Kpa iii) Deformation Dial Gauge Axial deformation of the sample shall be measured with a dial gauge having a least count of 0.01 mm and travel to permit not less than 20 % axial strain. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGEC campus. | 3 Years |
| 74. | Sand Pouring Cylinder (Small) | The sand pouring cylinder (small) is suitable for conducting field density estimation of fine and medium grained soils. | | | | | | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|---|---|------------------------------|
| | | <p>It should confirm to IS: 2720 (Part XXVIII). The apparatus should consists of followings:-</p> <p>i) Sand Pouring Cylinder, 115 mm internal dia with conical funnel and shutter.</p> <p>ii) Calibrating Container, 100 mm inner dia. and 150mm deep with flange 50mm wide.</p> <p>iii) Metal tray 300mm square x 40mm deep with a 100mm dia. hole at the centre.</p> <p>Beside this, the following accessories are to be supplied along with apparatus.</p> <p>Metal tray 300 mm square x 40 mm deep without hole.</p> <p>Glass plate 450 mm square x 9 mm thick.</p> <p>Dibber.</p> <p>Scraper.</p> | | | | | | |
| 75. | Direct Shear | <p>To find out shear strength of soil</p> <p>The apparatus should consist of square divided in to two halves .The specimen , contained in the box, is subjected to a constant load normal load while an increasing horizontal force is applied one of the section of the shear box. The loading unit as V strips on which the shear box housing rests. Suitable for specimens of size 60x60x25 mm³. suitable for operation on 220 V,50 hertz , single phase A.C. supply</p> <p>It should be certified from NABL/ILAC/Govt. Lab.</p> | | | | Catalogue/ Instructional manual/ Wall Chart | <p>Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGSEC campus.</p> | 3 Years |
| 76. | Automatic Triaxial Test Apparatus | <p>Automatic Triaxial Testing System</p> <p>Rates of Strain: 6 variable speeds between</p> <p>Suitable for operation on 220 V, 50 Hz, 1 phase, AC supply.</p> <ul style="list-style-type: none"> Two pillar type. | | | | Catalogue/ Instructional manual/ Wall Chart | <p>Installation shall be in scope of supplier without any cost. Further, installation also include the</p> | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|-----------|--|------------------------------|
| | | <ul style="list-style-type: none"> • Enclosed motor and Gear System • Jewel lamps indicating direction of motion • Operational ease. • Facility to auto cut the motor <p>Universal Triaxial Cell, Stationary bushing – 10 bar For testing specimens of size 38 mm dia x 76mm long. Triaxial cell comprises of a perspex chamber with an anvil and a loading plunger. The cell is easily split by releasing four tie rods. It is leak proof upto 10 bar (10 kg/cm²)</p> <p>The equipment consists of the following replaceable parts Top loading pad, Perspex, 38mm dia. 1 No, Plain Perspex disc 38mm dia x 6 mm thick 1 pair, Porous Stone 38mm dia x 6 mm thick 1 pair, Sheath stretcher for 38mm dia specimen 1 No, Sand former for 38 mm dia. 1 No., Rubber sheath for 38mm dia specimen 12 Nos. Drainage tube (short), 38 mm 4 Nos, Drainage tube (long), 38 mm 4 Nos, ‘O’ rings for 38mm dia specimen 8 No, Brass pedestal 38 mm dia. 1 No.</p> <p>Split Mould, 38mm Dia x 76mm long 1 No. Top loading pad 38mm (plain) 1 No</p> <p>Suitable for operation on 220 V, 50 Hz, Single Phase, AC supply</p> | | | | | material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGGEC campus. | |

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|----------|-----------------------------------|---|----------|-------------|-------------|-----------|--|------------------------------|
| | | <p>Triaxial Electronic Conversion Direct reading of strain, load and pore pressure External load cell, 10 kN capacity, Pore Pressure Transducer, 20 bar (20 kg/cm²) capacity, an LVDT (Displacement Sensor) having a range of 0-20mm. Power supply Voltage : 220V, 50Hz, Single Phase</p> <p>PC connection and software for further analysis the report data.</p> | | | | | | |
| 77. | Infrared Moisture Meter | <p>To find out water content of soil The infrared moisture meter should be able to operate on 220 Volts AC supply. The apparatus should be completely automatic and to provides % moisture loss through entire drying cycle. The Heating arrangement should consist of 250 watts heating lamp with a solid state power stat to control rate of drying and also temperature.</p> | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 78. | Core Cutter | <p>Cylindrical Core-Cutter of seamless steel tube, 130 mm long and 10 cm internal diameter, with a wall thickness of 3 mm, hevelled at one end, Steel Dolley 2.5 cm high and 10 cm internal diameter with a wall thickness of 7.5 mm with a lip to enable it to be fitted on top of the core-cutter Steel Rammer With solid mild steel foot 140 mm diameter and 75 mm height with a concentrically screwed 25 mm diameter solid mild steel staff. The overall length of the rammer including the foot as well as the staff should be approximately 900 mm.</p> | | | | | | 3 Years |

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|----------|---|---|----------|-------------|-------------|---|--|------------------------------|
| 79. | Laboratory Permeability Apparatus | As per Standards IS:2720 (Part 17), IS:11209 Constant Head Permeameter and Falling Head Permeameter Falling Head Permeameters for testing remoulded or undisturbed fine grained soil having less than 10.2 cm/sec coefficient of permeability and Constant Head Permeameters for coarse grained cohesion less soils. | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 80. | Standard Proctor Compaction | i) Proctor mould having a capacity of 944 cc with an internal diameter of 10.2 cm and a height of 11.6 cm. The mould shall have a detachable collar assembly and a detachable base plate. ii) Rammer: A mechanical operated metal rammer having a 5.08 cm diameter face and a weight of 2.5 kg. The rammer shall be equipped with a suitable arrangement to control the height of drop to a free fall of 30 cm. Sample extruder, mixing tools such as mixing pan, spoon, trowel, and spatula. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 81. | Computerised California Bearing Ratio Machine | Laboratory California Bearing Ratio Test Apparatus, Motorised, Three speed <ul style="list-style-type: none"> • Load Frame, 50 kN Capacity, Three Speed 1.5, 1.25 & 2.5 mm/min • Mould - Metal 150mm ID x 175 mm H (3nos) • Perforated Base Plate – Metal(3nos) • Extension Collar - Metal 150 mmm ID x 50 mm high (3nos) • Penetration Piston 50 mm face dia • Adjustable Bracket for Penetration Dial Gauge | | | | Catalogue/ Instructional manual/ Wall Chart | Installation shall be in scope of supplier without any cost. Further, installation also includes the material required for installation. The Bidder will also provide minimum 1-2 week hands on training at MGEC campus. | 3 Years |

| Item No. | Name of Goods or Related Services | Technical Specifications of items and /or Bureau of Indian Standards(BIS) (if applicable) reference | Features | Accessories | Spare parts | Documents | Installation & Training | Warranty of Equipment/ Parts |
|----------|-----------------------------------|---|----------|-------------|-------------|-----------|---|------------------------------|
| | | <ul style="list-style-type: none"> • Circular Metal Spacer Disc, with detachable handle, 148 mm dia. x 47.7 mm high • Annular Metal Weight 2.5 kg, 147 mm dia with 53 mm dia central hole • Slotted Metal Weight 2.5 kg, 147 mm dia, with 53 mm dia. slot • Perforated Plate 148 mm dia, with adjustable stem and lock nut • Metal Tripod for Dial Gauge • Cutting Collar • Rammer 2.6 kg, 310 mm-controlled drops • Rammer 4.9 kg, 450 mm-controlled drops • Load cell Capacity 50 kN • LVDT 25 mm travel Electronics kit:- 4-Channel Data logger cum indicator with inbuilt storage the all Channel data, Display 20x4 Alpha numeric LCD – 1 no Live Data logging software directly in excel format of all channel's data with date and time, PC Interface through USB Facility to data logging externally thorough pen Drive, All channel data in excel Format with data and time 5 point Calibration facility | | | | | | |
| 82. | Hot Air Oven | To heat soil sample. Should be able attain temperature 50 to 250 degree Celsius ± 1 Celsius. Inside size 450 \times 600 \times 450 mm \times mm \times mm | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required | 3 Years |

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|----------|-----------------------------------|---|----------|-------------|-------------|-----------|---|------------------------------|
| | | | | | | | for installation | |
| 83. | Digital Analytical Balance | To weigh the samples Electronic, The electronic balance should be able to operate with battery as well with A.C. power supply, The balance should have accuracy up to 0.01g. Measurement up to 3Kg. | | | | | Installation shall be in scope of supplier without any cost. Further, installation also include the material required for installation | 3 Years |
| 84. | Metal Tray | To carry samples Sized 30 cm x 30 cm x 4 cm, non-corrodible surface, painted | | | | | | 3 Years |

4. Drawings

Not Applicable