SPECIFICATION FOR TRADE IoT TECHNICIAN (SMART CITY)

(INTERNET OF THINGS)

(Non-Engineering Trade)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Directorate General of Training

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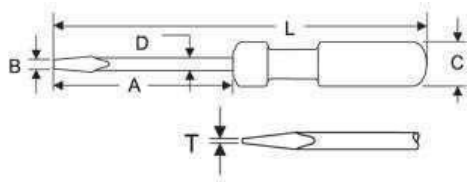
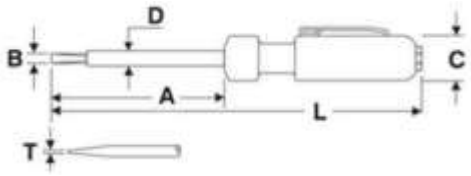
1. Connecting screwdriver



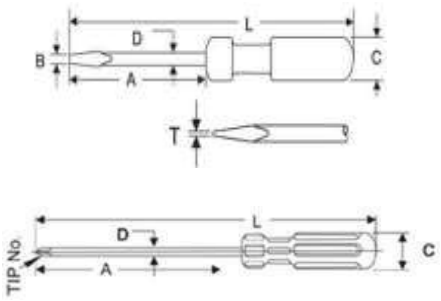
1.1 Basic Indicative Diagram
1.2 Generally conform to IS 844 - 1979
1.3 Dimensions:
1.3.1 Size: 10 mm X 100 mm (A - 100 mm, D - 10 mm)
1.3.2 Tip Bit Size: B X T : 10 mm X 0.6 mm
1.4 Blade:
1.4.1 Blade made of high grade Silicon - Manganese Steel (EN 45 A)
1.4.2 Blade should be differentially hardened & tempered to resist wear, bending & meet high torque requirement
1.4.3 Hardness on Tip: 55 - 58 HRC
1.4.4 Minimum Torque Value: 0.21 Kg.m
1.4.5 Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion
1.5 Handle:
1.5.1 Material of Handle: Cellulose Acetate
1.5.2 Handle should be made of high grade CA Plastic, which is non - flammable & unaffected by oil, petrol, grease, water - practically anything
1.5.3 Handle should withstand rough use including hammering
1.5.4 Handle design should be such that it gives comfortable grip even at higher torques
1.5.5 Handle & blade assembly should be insert moulded
1.6 Tip:
1.6.1 Tip should be formed by Forging & Trimming
1.6.2 Tip should be precision - ground to 10 degree angle to ensure firm grip in the screw slot.
1.6.3 The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position
1.6.4 Tip sides & faces should be well ground with good finish
1.6.5 Double ear coining should be provided for the blade.

2. Neon Tester 500 V.



2.1 Basic Indicative Diagram
2.2 Generally conforming to IS 5579 - 1985
2.3 Dimension
2.3.1 A: 60 mm
2.3.2 D: 6 mm
2.3.3 Tip Size: B X T = 3.5 mm X 0.5 mm
2.4 Minimum Torque Value: 0.09 Kg.m
2.5 Generally conform to IS 5579 - 1985
2.6 Blade made of high grade Silicon - Manganese Steel (EN - 45A)
2.7 Blade should be differentially hardened & tempered to resist wear, bending & meet high torque requirement
2.8 Hardness on Tip: 55 - 57 HRC
2.9 Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion
2.10 Handle should be made of high grade CA Plastic, which is non - flammable & unaffected by oil, petrol, grease, water - practically anything
2.11 Suitable for checking at minimum 90 V DC and 60 AC voltage and maximum upto 500 V AC
2.12 Blade is provided with PVC insulation sleeve & resistance having 1 mega ohm for preventing the electric shock
2.13 NEON filled glow lamp should give a visible glow in normal day light
2.14 Maximum leakage current of 0.12 microampere ensures safe & shock free in use.
2.15 Tip should be precision - ground to 5 degree angle to ensure firm grip in the screw slot.

3. Screw driver set



3.1 Basic Indicative Diagram**- Set of 7 Pieces**

Engineer's Screw Driver

Philips Screw Driver

Line Tester

3.2 Screw Drivers: 4 Numbers

3.2.1 Generally conform to IS 844 - 1979

3.2.2 Sizes (Sizes in mm) (MTV - Minimum Torque Value)

3.2.2.1 A: 100, D: 4, TIP SIZE: B x T (4.0 x 0.6), MTV: 0.15 Kg.m

3.2.2.2 A: 150, D: 6, TIP SIZE: B x T (6.0 x 0.8), MTV: 0.39 Kg.m

3.2.2.3 A: 150, D: 8, TIP SIZE: B x T (8.0 x 1.2), MTV: 1.17 Kg.m

3.2.2.4 A: 125, D: 5, TIP SIZE: B x T (5.0 x 0.6), MTV: 0.18 Kg.m

3.2.3 Blade:

3.2.3.1 Blade made of high grade Silicon - Manganese Steel (EN 45 A)

3.2.3.2 Blade should be differentially hardened & tempered to resist wear, bending & meet high torque requirement

3.2.3.3 Hardness on Tip: 55 - 58 HRC

3.2.3.4 Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion

3.2.4 Tip

3.2.4.1 Tip should be formed by Forging & Trimming

3.2.4.2 Machining Aspects: Tip sides & faces should be well ground with good finish. Double ear coining should be provided for the blade.

3.2.4.3 Tip should be precision - ground to 10 degree angle to ensure firm grip in the screw slot.

3.2.4.4 The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position

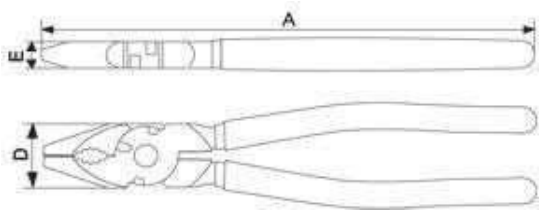
3.2.5 Handle:

3.2.5.1 Material of Handle: Cellulose Acetate

3.2.5.2 Handle should be made of high grade Cellulose Acetate Plastic, which is non - flammable & unaffected by oil, petrol, grease, water - practically anything

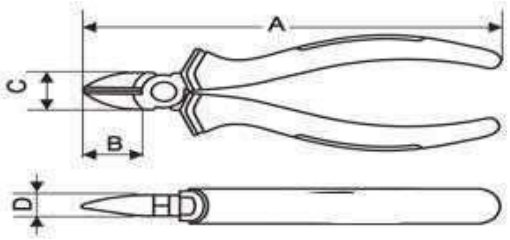
4. Insulated combination pliers

Handle should withstand rough use including hammering



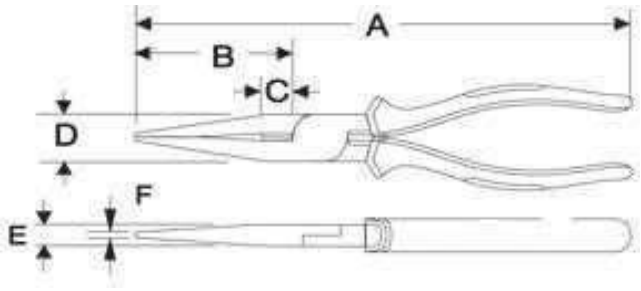
4.1 Basic Indicative Diagram – 150 mm
4.2 Generally, conform to IS 3650 - 1981
4.3 Material: C - 70
4.4 Finish: Polished / Chrome plated / Satin finish
4.5 Length (A): 150 mm
4.6 Drop forged, hardened tempered
4.7 Differential hardening
4.8 Radius Gap from front side: Upto 0.2 mm
4.9 Play between shanks: Upto 0.3 mm
4.10 Shank Material: C70 / EN9
4.11 Rivet material: SAE 1541 / 40Cr4
4.12 Cutting Edge Hardness: 60 - 62 HRC
4.13 Shank Hardness: 40 - 48 HRC
4.14 Rivet Hardness: 38 - 42 HRC
4.15 High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
4.16 Insulation Sleeves made from High Quality CA Plastic
4.17 Thicker Sleeves for comfortable Grip
4.18 Special thumb protector for sleeves to minimize the risk of electric shock in case plier slips while in use.
4.19 Should be able to cut soft (74 to 84 Kg/mm^2) &Hard (140 Kg/mm^2) wires
4.20 Should be able to cut 2 mm of hardwire Diameter & 1 mm of soft wire Diameter

5. Insulated side cutting pliers



5.1 Basic Indicative Diagram – 150 mm
5.2 Generally conform to IS 4378 - 1990
5.3 Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48 HRC)
5.4 Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
5.5 Rivet should be hardened and made of carbon Steel
5.6 Length: 150 mm
5.7 High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
5.8 Insulation Sleeves made from High Quality CA Plastic
5.9 Thicker Sleeves for comfortable Grip
5.10 Special thumb protector for sleeves to minimize the risk of electric shock in case plier slips while in use.
5.11 Should be able to cut soft (74 to 84 Kg/ mm^2) &Hard (140 Kg/ mm^2) wires
5.12 Should be able to cut 2.0 mm of hard wire Diameter & 1.5 mm of soft wire Diameter
5.13 Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease.

6. Long nose pliers



- Basic Indicative Diagram – 150 mm
- Generally conform to IS 3552 - 1989
- Length: 150 mm
- Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 -48 HRC)
- Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
- Rivet should be hardened and made of carbon Steel
- High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
- Minimum load value: 13.80 Kg
- Insulation Sleeves made from High Quality CA Plastic which are long lasting and willnot break or crack even if it falls from Height and ensures safe electrical working.
- Thicker Sleeves for comfortable Grip
- Special thumb protector for sleeves to minimize the risk of electric shock in case plierslips while in use.
- Should be able to cut soft (74 to 84 Kg/ mm^2) &Hard (140 mm^2) wires
- Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter: 1.0mm
- Cutting edges should be sharp and precision machined to appropriate angle to cutthick and thin wires with ease.

7. Soldering iron

- Basic Indicative Diagram – 25 watt, 240 volts
- Should have Specially coated Copper bits (High Quality) for Longer Life.
- Should have Special double layered cartridge type element transfer heat very efficiently directly to the bits.
- Should have Iron reach soldering temperature within few seconds
- Should have Prolonged Life of heating Elements and Soldering Bits.
- Should have Extremely low leakage current.
- Should have Very light and heat resistant handles for comfortable use.
- Tip replacement should be Easy and speedy
- 25 Watts/ 240 Volts Soldering Iron Should have Maximum Temperature: $380^{0}C$

8. Electrician knife

- Basic Indicative Diagram – 100 mm
- Blade should be made of high grade Steel for sharp and long cutting
- Hardness: 62 - 64 HRC
- ABS Plastic Body for higher strength & soft material for comfort in use
- Slider locking system for enhanced safety
- Blade Width: 18 mm

9. Tweezers

- Basic Indicative Diagram – 150 mm
- Total Length: 150 mm ± 1 mm
- Total Width.: 9.3 mm ± 0.1 mm
- Total thickness: 1.2 mm ± 0.05 mm
- Material Stainless Steel
- Hardness: 40 - 42 HRC
- Should be useful for beading and many aspects of watch & clock repair.

10. Digital Multimeter

10.1 Basic Indicative Diagram – 3 ½ Digit
10.2 Basic Accuracy (Resistance): ±(0.8% + 1)
10.3 Display: 3½ digit LCD display (1999 Counts)
10.4 Resistance: 200 Ω to 20M Ω
10.5 Capacitance: 2nF to 600µF
10.6 Inductance: 2mH to 20H
10.7 Diode measurement: Should be available
10.8 Transistor Measurement: Should be available
10.9 Continuity Buzzer: Should be available
10.10 Low battery Indicator: Should be available
10.11 Overload Protection: Should be available
10.12 Compliance: CE certificate
10.13 LCD Size: 60 mm X 30 mm (±10%)
10.14 Product Size: 170mm X 80mm X 40 mm (±10%)
10.15Accessories
10.15.1 Required Batteries
10.15.2 Test Clip
10.15.3 Holster
10.15.4 Operation Manual
10.15.5 Calibration Certificate
10.15.6 Plastic or Wooden Carrying Case with required cushioning

11. Soldering Iron Changeable bit

11.1 Basic Indicative Diagram – 15 watt, 240 volt
11.2 Should be suitable for soldering
11.3 Should have changeable iron plated tips are available to make the soldering station excellent for electronic and electric use.
11.4 Length: 18.5 cm (±5%)
11.5 Cable Length: 140 cm (±5%)
11.6 Working Voltage: 240V 50HZ
11.7 Power: 15W
11.8 Suitable for lead-free soldering semiconductors
11.9 ron Tips: 5
11.10 Should have low current leakage
11.11 Should have constant tip temperature
11.12 Should have high quality Pointed Bit for high end precision soldering
11.13 Should quickly attains working temperature
11.14 Thinner grip for high comfort

12. De - Soldering Pump electrical heated, manual operator

12.1 Basic Indicative Diagram: 230 v, 40 w
12.2 Used to remove heated solder from a PCB
12.3 Should be made from high grade aluminum for light weight and airtight function
12.4 Tip should be made of high temperature resistant Teflon

13. Steel Rule Graduated both in Metric and English Unit

13.1 Basic Indicative Diagram – 300 mm
13.1 Material: Stainless Steel
13.2 Thickness: 0.5 mm
13.3 Hardness: 30 - 35 HRC (Specially Hardened)
13.4 Finish: Polished 2B / Anti-Glare Satin Chrome
13.5 Surface roughness: 0.6 Microns max
13.6 Range: 300 mm
13.7 Measuring least count: Metric Graduation +0.5 mm and English graduation 1 /64 inch

14. Precision set of screw drivers

14.1 Basic Indicative Diagram – set of 6
14.2 Blade Hardness: 52 - 55 HRC
14.3 Blades made of High Grade Alloy Steel for extra-long life & High Torque
14.4 Soft material on screw driver's body for better gripping and comfort
14.5 Black Electro - lacquering finish to protect blades from corrosion
14.6 Flat Tip blades: 1.4 mm, 2.0 mm, 2.4 mm, 3.0 mm,
14.7 Philips Blades: Tip no. 0 and Tip no. 1

15. Tweezers – Bend tip

15.1 Basic Indicative Diagram- 100 mm
15.2 Total Length: 115 mm ± 1 mm
15.3 Total Width.: 9.6 mm ± 0.1 mm
15.4 Total Thickness: 1.5 mm ± 0.05 mm
15.5 Material Stainless Steel
15.6 Hardness: 40 to 42 HRC
15.7 Should be useful for beading and many aspects of watch & clock repair

16. Steel measuring tape

16.1 Basic Indicative Diagram – 5 mtr

16.2 Tape length: 5 meters
16.3 Tape width: 13 mm
16.4 Tapes coated with Epoxy based scratch guard material to ensure longer life
16.5 Bold & Easy to read printing
16.6 Ensures Class II Accuracy at 20 Degrees when subjected to tension of 50 Newton
16.7 Strong Copper Rivet to ensure stronger end hook

17. Tool makers vice (100 mm)

Toolmakers Precision Machine Vice – 100mm Jaw Width.

Jaw width	100 mm
Jaw height	45 mm
Opening capacity	100 mm
Weight (nt)	7.3 kg
Material	HQ Iron
Paint	Anti rust, Poweder coating
Use	Holding MS and other ferrous metal jobs in workshop

18. Tool makers vice(50 mm)

18.1 Basic Indicative Diagram – 50 mm
18.2 Total Length: 153 mm ± 2 mm
18.3 Jaw Width: 50 mm ± 2mm
18.4 Total Height: 80 ± 2mm
18.5 Body material: Ductile Cast Iron
18.6 Spring should easily go up & down
18.7 Should be used during grinding, hammering etc.

19. Crimping tool (pliers)

19.1 Basic Indicative Diagram - 7 in 1
19.2 Should have the following 5 functions
19.2.1 Wire cutter
19.2.2 Wire stripper
19.2.3 Bolt cutter
19.2.4 Insulation crimping
19.2.5 Non insulation Crimping
19.3 Size: 225 mm
19.4 Induction hardened cutting edges
19.5 Finger Guard for Better Control & Added Safety
19.6 Bi - material Grip for comfort

20. Magneto spanner set

Technical Details

Color	Silver
Product Dimensions	33 x 6 x 5 cm; 1.11 Kilograms
Shipping Weight	1.19 Kilograms
Is Assembly Required	No
Finish Type	Nickel Chrome
Capacity	8-Pieces
What is in the box?	8 Pcs Ring Spanner Set
Weight	2.45 Pounds

21. File flat bastard

	From	To
21.1 Basic Indicative Diagram – 200 mm with handle Range (In MM)		
21.2 Generally conforming to IS 1931-2000		
21.3 Body Length (L)	198	202
21.4 Tang Length (TL)	54	56
21.5 Width (W)	19.6	20.6
21.6 Thickness (T)	3.7	4.4
21.7 No. of Upcut / Inch	24	26
21.8 Upcut inclination	640	660
21.9 No. of Overcut / Inch	18	20
21.10 Overcut Inclination	440	460
21.11 No. of Edge cut / Inch	25	27
21.12 Edge cut Inclination	890	910
21.13 Hardness	60 HRC	64 HRC
21.14 Performance in 7500 strokes	15	15.5
21.15 Rake Angle	-70	-120

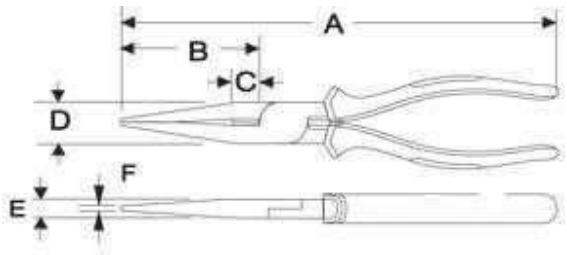
22. File flat second cut

Size	8"/200mm
Weight (Kg)	2.0000
Type	2nd Cut
Material	Steel
Style	Flat Files
Length	200
Length-mm	200
Outer Diameter-mm	200
Diameter	200

23. File flat smooth

Type of Product :	File
Shape :	Flat
File Type :	Smooth
Length :	200 mm
Material :	Steel
Weight :	1.800

24. Plier Flat Nose



24.1 Basic Indicative Diagram – 150 mm
24.2 Generally conform to IS 3552 - 1989
24.3 Length: 150 mm
24.4 Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48 HRC)
24.5 Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
24.6 Rivet should be hardened and made of carbon Steel
24.7 High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
24.8 Minimum load value: 9.58 Kg
24.9 Insulation Sleeves made from High Quality CA Plastic which are long lasting and will not
break or crack even if it falls from Height and ensures safe electrical working.
24.10 Thicker Sleeves for comfortable Grip
24.11 Special thumb protector for sleeves to minimize the risk of electric shock in case plier
slips while in use.
24.12 Should be able to cut soft (74 to 84 Kg/ mm^2) &Hard (140 mm^2) wires
24.13 Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter: 1.0 mm
24.14 Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease

25. Round Nose pliers

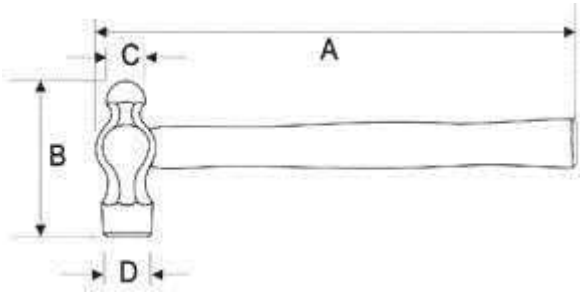
Technical Details

Specification	(100 mm)
Product Dimensions	125 x 51 x 6.5 cm; 55 Grams
Shipping Weight	0.13 Pounds
Is Assembly Required	No
Primary material	Iron
Capacity	Standard
Container content	10 N Round Nose Mini Plier
Weight	55 Grams

26. Scriber Straight

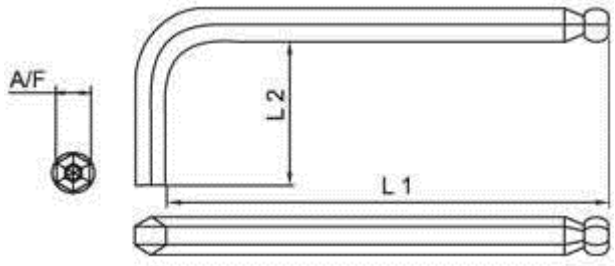
26.1 Basic Indicative Diagram – 150 mm (Straight and bend)
26.2 Scriber with Min. Length 150
26.3 90 ° Bend and Straight
26.4 Both Point end Hardness 55 - 60 HRC
26.5 Should be of material EN - 9

27. Hammer ball pen



27.1 Basic Indicative Diagram – 500 grams with handle
27.2 Generally conform to I.S. 841 - 1983
27.3 Ball Peen Hammer
27.4 Length: 300 mm + 10%
27.5 Weight: 500 grams
27.6 Drop forged from high grade carbon Steel
27.7 Material: EN - 9
27.8 Partially hardened upto 46 - 56 HRC on striking surface
27.9 Depth of Hardness: 6 mm
27.10 Phosphated and painted
27.11 Handle
27.11.1 Material: Hickory Wood/ Red Wood/ Babul Wood/ Indestructible Handle
27.11.2 Handle fixed firmly to hammer head so that it does not come out after long use

28. Allen Key Set (set of 9 Keys)



28.1 Basic Indicative Diagram – Hexagonal – 1.5 – 10, set of 9 keys
28.2 Generally conform to I.S 3082 - 1988 pipe 117.3 Sizes in mm: 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10
28.3 Made from high grade alloy Steel - Chrome Vanadium Molybdenum (S2) which enables 30% higher torque as compared to Allen keys made from Cr - V Steel
28.4 Higher Hardness 57 - 62 HRC
28.5 Ball Head on one side to facilitate tightening & loosening of screws at 15 degree
28.6 Precision drawn and machined
28.7 Specially coated and Oiled for rust prevention

29. Tubular box spanner

29.1 Basic Indicative Diagram – set of 6 - 32
29.2 Generally conforming to I.S 2030 - 1989
29.3 Made from tubular section of Steel
29.4 Heat treated to give maximum strength
29.5 Hardness: 29 to 34 HRC (carburizing depth minimum up to 0.3 mm)
29.6 Body and Hexagon should have good alignment and ends should be square with axis
29.7 Bright Zinc plating for rust protection
29.8 Sizes in mm: 6X7, 8X9, 10X11, 12X13, 14X15, 16X17, 18X19, 20X22, 21X23, 24X27, 25X28, 30X32

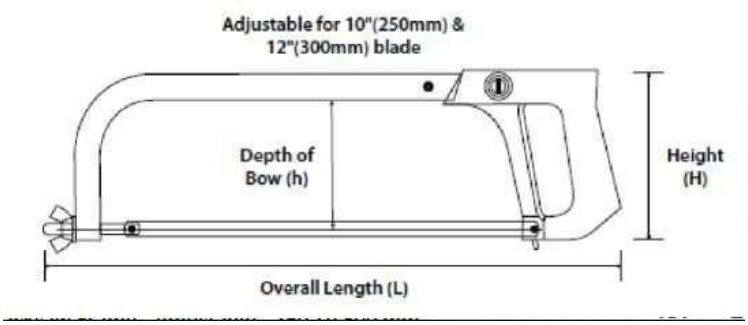
30. Magnifying Lenses

Durable, toughen and hardened glass with good focal length 75 mm

31. Continuity Tester

31.1 Basic Indicative Diagram – Earth Resistance / Leakage Tester – Digital Clamp type
31.2 Display: **4 ½** Digit LCD Backlight Display.
31.3 Should also measure leakage current
31.4 Jaw Size: 65 x 32 mm.
31.5 Span of Jaw: 32mm.
31.6 Operating Temperature: -10 C ~ 55 C
31.7 Protection grade: Double Insulation
31.8 Range selection: Automatic
31.9 Sampling Time: 1 second
31.10 Earth Resistance Measurement Range: 0.100 ~ 1200Ω
31.11 Resistance Measurement Resolution: 0.001 Ω
31.12 Resistance Measurement Range: 0.10 mA ~ 20.0A
31.13 Dimensions (LxWxH) in mm (±10%): Approx. 300 X 90X 55
31.14 Net Weight (±10%): Approx. 1000 Grams (Excluding batteries)
31.15 Power Supply: 6VDC (4 x AAA Alkaline Dry Battery).
31.16 Accessories
31.16.1 Standard 5.1 ohm Testing Coil
31.16.2 Batteries
31.16.3 Operating Manual
31.16.4 Interface Cable
31.16.5 Heavy Duty Carrying Case

32. Hacksaw Frame Adjustable



32.1 Basic Indicative Diagram – 250 – 300 mm
32.2 Adjustable for 10 inch (250mm) & 12 inch (300mm) blades
32.3 The blade can additionally be set for sawing at 90°
32.4 Storage compartment in the tubular bow should allow for storing spare blades
32.5 Should be Fitted with a 12" (300 mm) Steel hacksaw blade
32.6 Overall Length(L): 430mm + 10%
32.7 Height(H): 150 mm + 10%
32. 8 Depth of Bow(H): 106mm + 10%
32.9 Strong Frame
32.10 Should have adjustable tension lever
32.11 Should be able to build 30000 PSI in 12 turns

33. Chisel – Cold – Flat

KEY FEATURES

- Painted to Provide Anti-Rusting Properties.
- Hardened & Tempered to Ensure Best Combination of Hardness & Toughness.

PRODUCT SPECIFICATIONS

Shape	Octagonal
Size	10x150 mm
Material	Carbon Steel
Standards	EN 9
Suitable For	Wood, Stone, Metal By Hand, Struck with a Mallet & Mechanical Power

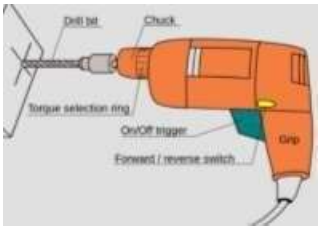
34. Scissors

34.1 Basic Indicative Diagram – 200 mm, Paper, Plastic handle, Right hand
34.2 Length: 200mm
34.3 Should have precise blade alignment ensures smooth cutting
34.4 Should have high-grade stainless-steel blades are hardened and precision ground for a sharper long-lasting cutting edge
34.5 Should have comfortable grip
34.6 Should have Orbital riveting for correct tension between blades and for lasting performance
34.7 Should have slightly concave and uniquely levelled blades maintain the sharpness and also work with maximum efficiency right up to their tips
34.8 Should have ABS plastic handles
34.9 Should be suitable for cutting cloth, thick cardboard, film, yarn, textile, etc
34.10 Material: Stainless Steel

35. Hand Saw

35.1 Basic Indicative Diagram – 450 mm
35.2 Total Length of hand saw: 600 mm ± 3 mm
35.3 Blade Length: 450 mm ± 2 mm
35.4 Blade thickness: 0.8 mm ± 0.1 mm
35.5 Blade Hardness: 55 - 60 HRC
35.6 Blade material: High Carbon Steel
35.7 Large sculpted handle and long, slightly tapered blade.
35.8 Handle design should make it easier to control and produces more precise cuts in job.

36. Hand Drill Machine Electric with Hammer Action



36.1 Basic Indicative Diagram: 13 mm
36.2 Drilling machine should generally conforming to IS 36501 - 1981.
36.3 Power input: 600 Watt (Min.)
36.4 Drilling diameter:
36.4.1 Concrete: 13 mm
36.4.2 Steel: 10 mm
36.4.3 Wood: 25 mm
36.5 No load speed: 0 – 2800 rpm
36.6 Impact rate: 25000 bpm
36.7 Should have soft in line grip for a secure hold
36.8 Should have Rotating brush plate for constant power in reverse and forward rotation
36.9 Should have Forward / Reverse rotation for inserting and removing screws
36.10 Should be able to have Easy and precise control of the RPM - variable speed
36.11 Should have double insulation – shock proof fiber body
36.12 Dimensions:
36.12.1 Overall Length in mm (± 10 %): 275 mm
36.12.2 Overall Height in mm (± 10 %): 180 mm
36.12.3 Net Weight (without cable & blade) (± 10%.): 1.7 kg
36.13 Protection Class: Double Insulation
36.14 Standard Accessories
36.14.1 Auxiliary handle = 01 no
36.14.2 Blow molded plastic case to securely fit all pieces for easy organization and convenient portability = 01 no
36.14.3 Depth gauge = 01 no
36.14.4 Spirit level (225 mm) with 3 spirit bulbs (for horizontal, vertical & angular level testing) = 01 no
36.14.5 Knife (Length - 150 mm, Blade width 15 mm) = 01 no
36.14.6 Claw Hammer (Weight 340 grams) = 01 no
36.14.7 Adjustable Wrench (Length 150 mm, Maximum jaw opening 19 mm) = 01 no
36.14.8 Combination Plier (Length 160 mm, Maximum jaw opening 25 mm) = 01 no
36.14.9 Measuring tape (Length 3 meter, 11 mm tape width) = 01 no
36.14.10 Drill bits
36.14.10.1 Masonry: 05 no
36.14.10.2 Wood: 04 no
36.14.10.3 HSS: 05 no
36.14.11 CRV Bit: 10 no
36.14.12 Magnetic Bit Holder: 01 no
36.14.13 Socket: 7 no
36.14.14 Socket Adaptor: 1 no
36.14.15 Assorted Screws: 30 no
36.14.16 Assorted Plastic Plugs: 30 no

37. First Aid Kit

Cotton swabs, bandages, scissors, dettol and necessary medications

38. Bench Vice

Bench Vice - 100 mm

38.1 Basic Indicative Diagram
38.2 Total Length: 330 mm ± 2 mm
38.3 Height: 130 mm ± 2 mm
38.4 Jaw Width: 100 mm ± 2 mm
38.5 Jaw depth: 55 mm ± 2mm
38.6 Jaw opening: 130 mm + 2mm
38.7 Body should be made from shock resistant Cast Iron & should be free from sand holes.
38.8 Malleable Steel nuts for extra tuff grip.
38.9 Jaw made of special carbon Steel (properly heat treated grinded).
38.10 Clamping force: 2200 Kgf

Bench Vice - 125 mm

38.1 Basic Indicative Diagram
38.2 Total Length: 380 mm ± 2 mm
38.3 Height: 155 mm ± 2 mm
38.4 Jaw Width: 125 mm ± 2 mm
38.5 Jaw depth: 70 mm ± 2mm
38.6 Jaw opening: 145 mm ± 2mm
38.7 Body should be made from shock resistant Cast Iron & should be free from sand holes.
38.8 Malleable Steel nuts for extra tuff grip.
38.9 Jaw made of special carbon Steel (properly heat treated grinded).
38.10 Clamping force: 2600 Kgf

Bench Vice - 50 mm

Product description

Specification Item: Table Vice Material: high-carbon steel Color: black silver Model: 50MM Jaw Width: Approx.65mm Jaw Openning: Approx.50mm Maximum Base Hold Capacity: Approx.62mm Swivel Base: 360 degrees Weight: Approx.1.55kg(50 model) Features: 1. 100% Brand New And High Quality. 2. Durable Steel Construction, Sturdy And Durable. 3. Widely Used, Convenient And Easy To Use. 4. Two-Way 360°Swivel At The Base And Jaw. Package Contents: 1x 50mm heavy duty table vise Only the above package content, other products are not included.

39. Multiple Output DC Regulated Power Supply

Technical Specifications:

DC Output :A : 0-32 V, 2 A, continuously variable by means of Coarse and Fine controls
B : 5 V, 5 A adjustable from 4 V - 6 V
C:0 - ±15 V, 1 A Dual Tracking adjustable
Resolution : Voltage : 10 mV
Current : 10 mA
Load Regulation : ± (0.05 %+100 mV)
Line Regulation : ± (0.05 %+100 mV)
Ripple & Noise : ≤ 1 mVrms
Display : 3 digits for voltage & current
LED indication for voltage & current
Over Range Indication: Should be there

40. DC Regulated Variable programmable DC Power Supply.

40.1 Basic Indicative Diagram

Technical Specifications:

40.2 Output Voltage: 0-30V /3 amp.

40.3 Numeric key pad,PC Interface & LCD for voltage Current & power.

40.3 Output Current : 0-3 Amp

40.4.Current limit exceed indication (LED)

40.5.Step increment for Voltage

40.6.Constant voltage source and Constant current source

40.7.USB PC interface with computer software

40.8. Voltage Regulation: Line < 0.05%, Load < 10mV %

40.9. Current regulation: Line <0.05% , Load <mA

40.10. Ripple: Voltage(mVr.m.s.) <20mV,
Current(mAr.m.s.) <10mA

40.11. Resolution:
Voltage 10mV/20mV,
Current 2mA.

40.12. Program accuracy:
Voltage: +/- 0.05% rdg 4digits
Current: +/- 0.1%rdg 5digits

40.9 Meter resolution: same as resolution (point 40.7)

40.10 Meter Accuracy: same as Program accuracy (point 40.8)

40.11 Protection: OVL/OCL/OPL/OTP

40.12 Output ON/OFF control

40.13 Display LCD with backlight ON/OFF option

40.14 PC Interface: Standard: RS232

40.15 Power Source: 115V/230V AC,50/60Hz

40.15 Accessories: 1x Manual, Power cord, Test leads (all standards), RS232

- termination interface Cable.

41. LCR Meter Digital handheld.

Technical Specifications:

- It can Measure six basic parameters R,C,L equipped with SMD Component Test Fixture
- Test Parameter: L-Q, C-D, R-Q, |Z|-Q
- Range mode: Auto, Hold
- Measurement speed: Fast: 10, Med: 5, Slow: 2 (meas/sec)
- Correction Function: Open/Short multi frequency Zeroing
- Measurement Terminals: Five Terminals
- Test Frequency: 100Hz,120Hz,1kHz,10kHz,
- Signal level: 0.3Vrms, 1Vrms
- Measurement Display Range
- C: 0.001pF - 9999µF
- L: 0.001µH – 9999H
- R: 0.0001Ω - 99.99MΩ
- Display: 3.5” LCD with backlight
- Connectivity: USB

42. 70 MHz Mixed Signal Oscilloscope (4 Analog + 16 Digital Channel)

42.1 Basic Indicative Diagram

Technical Specifications:

With more than 20mpt (Single channel) 10 mpts (2 channels) , 5 mpts (3-4 channels) memory Real time Sampling rate 1 GSa/Sec (single channel) 500Msa/s (2 channels), 250 MSa/s (3-4 Channels), Having Lan interface with,12C,SPI,Runt etc.& RS232/UART,12C & SPI Tigger Decoding functions,2 Channel 25 MHz awg with 14 bit vertical resolution and 200MSa/s sample rate, math function like differentiation, integration, abs, AND, OR, NOT etc. Should have vertical range 1mV/div -10V / div, horizontal range 5ns/div to 50 s/div, 6 Bits precise hardware counter, filters (Low Pass Filter, High Pass Filter, Band Pass Filter, Band Stop Filter) real time waveform recording and playback functions, USB Host & Device, LAN (LXI), AUX Connectivity.
Component tester: Component Tester: To work with DSO to test short circuit, open circuit, polarity testing of diode and transistors comparative test for trouble shooting of electronic circuits.

43. 25 MHz Arbitrary Waveform Generator with Digital Display for Frequency and Amplitude

43.1 Basic Indicative Diagram

43.2 Max. Output Frequency: 25 MHz

43.3 DDS Technology

43.4 Two channel/Dual Channel output

43.5 Basic Waveform: Sine (1µHz -25MHz), Square (1µHz -25MHz), Ramp (1µHz- 400KHz) , Pulse (1µ - 15MHz), Noise , Harmonic

43.6 200 MSa/s Sampling Rate

43.7 2Mpt memory with more than 150 different arbitrary waveforms and built in in 8^{th} order harmonic generation

43.8 14-bit vertical resolution

43.9 5 Types of standard output waveforms

43.10 Built-in 46 arbitrary waveform including DC

43.11 Modulation Function: AM, FM, PM, FSK, ASK, PWM, Linear/Logarithmic, Sweep,Burst

43.12 Standard interface USB device, USB Host

43.13 150 MHz Built-in Frequency Counter

43.14 PC Connectivity USB Device/Host and LAN

43.15 3.5-inch TFT LCD Display

42.17 Operation Manual/ OEM software for the integer face and control purpose.

44. 6 ½ Digit Digital Multimeter

44.1 Basic Indicative Diagram

Technical Specifications :-Measurement Functions: DC &ACVoltage, DC&AC Current, 2-wire & 4-wire Resistance, CAP, Diode, Connectivity,Frequency, Period, Any Sensor.

Temperature: RTD, THERM,TC (B/E/J/K/N/R/S/T) PC Interface USB Host, USB Device, LAN(LXI-C) Measurement Speed 10k readings/sec

44.2 DC voltage and Current : 1000V/ 5A
44.3 AC voltage and Current: 750v/ 5A
44.4 Resistance 2 wire and 4 wire resistance measurements.
44.5 Capacitance, Diode, connectivity/continuity testing / measurements.
44.6 Time period and frequency measurements.
44.7 Any sensors: RTD, Thermocouple, TC (B/E/J/K/N/R/S/T)
44.8 PC Interface USB Host, USB device, LAN(LXI-C)
44.9 Measurement speed: 10K reedings/sec.
44.10 OEM standard software control support.

45. 3GHz Spectrum Analyzer with built-in Tracking Generator

45.1 Basic Indicative Diagram

Technical Specifications:

Frequency Range 9 kHz to 3.2 GHz Resolution Bandwidth(-3 dB): 10 Hz to 1 MHz Built in tracking generator Min. -148 dBm DANL Display 8" TFT or more PC Interface: USB Host &Device, LAN(LXI)

45.2 Frequency Range from 9 kHz to 3.2 GHz, Resolution bandwidth (-3dB)
45.3 Min. -148 dBm Displayed Average Noise Level (DANL)
45.4 Min. <-90 dB c/Hz @ 10 kHz Offset Phase Noise
45.5 Level Measurement Uncertainty <1.0 dB
45.6 10 Hz Minimum Resolution Bandwidth
45.7 10 Hz to 3.2 GHz Tracking Generator
~~45.6~~ PC Interface: Complete Connectivity: LAN (LXI), USB Host & Device,
45.7 8 Inch TFT (800×480) Display

OR.

Electronics Work Bench. (,Item no. 39, 41, 42, 43, 44 and 45 can bepreferred in the form of workbench.)

Government of Maharashtra Directorate of Vocational Education and Training, Maharashtra State SPECIFICATION FOR ELECTRICAL AND ELECTRONICS TOOLS AND EQUIPMENT'S GROUP ITEMS
Version 3 2018 – 19**.**

46. Multi-Function Test & Measuring Tool for Field Applications and Testing compatible with Laptop

46.1 Basic Indicative Diagram

Technical Specifications :

- Should be an integrated instrument that includes a Digital Storage Oscilloscope, DC Power Supply, Arbitrary Function Generator and a Multimeter.
- Should have feature to configure camera, microphone, speaker and headphone jack, expand more teaching methods
- Should supports external HDMI display, mouse and keyboard, facilitating complex editing operations
- Should support communication via LAN.
- Should have 10.4” capacitive touch HD display.
- Should have following technical specifications
- Digital Storage Oscilloscope: 2 Channels 100 MHz oscilloscope, supports 1 GS/s sampling rate.
- Waveform Generator: 2 Channels 50 MHz function generator, supports 300MS/s sampling rate,14 bit vertical resolution.
- Power Supply: 15W Dual channel power supply (5V/3A), setting accuracy : 10mV/10mA:
- ½ Digits Digital Multimeter : 20000 counts, Support voltage, current, resistance, Diode test, Capacitance On/Off

47. Electrical Safety Trainer

47.1 Basic Indicative Diagram

Technical Specification: Demonstration of importance of earthling in any electrical device.

Arrangement to study role of fuse and types of slow blow, high blow fusein any electronic circuit.

Arrangement to study the importance of MCB and it's working

47.2 Has diagrammatic representation of circuitSmooth functioning

47.3 Designed, considering all safety standards such as demonstration of Importance of earthling in electrical circuits.

47.4 Real time appearance of MCB to help the students to understand it's Mechanical arrangement and working.

47.5 Demonstration of Fuse in very easy way with types of fuses: slow low,high Blow fuses in electrical, electronic circuits.

47.6 Provided with a manual containing colored graphical representation of many Safety standards and with very interesting activities which are to be performedby students

48. Analog Component Trainer with following Seven Basic Modules

- Study of V-I characteristics of
- Diode Characteristics (Si,Zener,LED)
- Rectifier Circuits
- Diode as Clipper Circuit
- Diode as Clamping Circuit
- Zener as voltage regulator.
- Transistor Type NPN & PNP and CE Characteristics
- Transistor as a switch

Technical Specification:

Breadboard for Circuit design DC power supply: +5V,1A (Fixed); +12V, 500mA (Fixed); ±12V, 500mA (Variable) AC power Supply: 9V- 0V-9V 500mA Function Generator: Sine, Square, Triangle (1Hz to 100KHz) Modulating Signal Generator: Sine, Square, Triangle (1Hz to 10KHz). Voltage, current and frequency on board LCD display.

PC Interface – Acquisition from two analog input channel

4

Technical Specification:-

Breadboard: Regular DC Supply: +5 V/1 A Clock Frequency 4 different steps from 1Hz – 100KHz Amplitude: (TTL), 128x64 Graphical LCD, Pulser Switches, Data Switches: 8 Nos, LED: 8 Nos. (TTL),Seven Segment Display, Teaching & Learning Simulation Software.

- Trainer RoHS compliant
- Trainer compact, lightweight and housing made of ABS material.
- Digital Electronics : Number Systems, Codes, Complements, Boolean Algebra, Logic Gates, Arithmetic Circuits: Adder, Subtractor,
- Combinational Circuits: Multiplexer, De multiplexer, Encoder, Decoder, Sequential Circuits (Flip- Flops): S-R Flip-Flop, D FlipFlop, J-K Flip-Flop, T Flip-Flop, Registers and Counters
- External ZIF Socket: ZIF socket consists of 40 pins with 2mm output socket for each pin 8, 14,16,20,40 pin ICs inserted without force. Supply Inputs connected to ZIF socket through 2mm patch Chord.

50. IT Workbench for computer hardware and networking

50.1 Basic Indicative Diagram

Technical Specification:

The bench comprises with Computer Hardware Training System (02 Nos.) The different circuit boards of PC/AT Computer are exposed on a PCB, LAN Training System with Wireless LAN as well to study Peer to Peer, STAR, RING Topology. Protocols: CSMA /CD, CSMA /CA, Stop N Wait Sliding Window, Token Bus, Token Ring, Colored representation of data intransmission & reception. Data transmission speed: 10/100 Mbps, Smart managed 3 Layer and 2 Layer Switch, Media converter, POESwitch, Wi-Fi LAN card, IP Camera, Energy meter, LED tube light, Voltmeter and Ammeter will be fitted. Networking Fundamentals.

Teaching Simulation Software DSO 50MHz 4 Channel , 1GSa/Sec ,more than 20 Mpt memory DSO with component tester DMM : 41/2 Digit with LCD Display.

50.2 The different circuit boards of PC/AT

50.3 Latest configuration ie i7 12th Generation, 16 GB RAM, 1 TB SSD Computer are exposed on a PCB,

50.4 LAN Training System with Wireless LAN as well to study Peer to Peer, STAR,RING Topology.

50.5 Protocols: CSMA/CD, CSMA /CA, Stop N Wait Sliding Window, 50.6 Token Bus, Token Ring, Colored representation of datain transmission & reception.

50.6 Data transmission speed:10/100 Mbps,

50.7 Smart managed3 Layer and 2 Layer Switch, Media converter, POE Switch,

50.8 Wi-Fi LAN card, IP Camera, Energy meter, LED tube light, Voltmeter andAmmeter will be fitted.

50.9 Networking Fundamentals Teaching Simulation Software

50.10 DSO 50MHz, 4 Channel 1GSa/Sec, more than 20 Mpt memory DSO with component tester

50.11 DMM 4 ½ Digit with LCD display

50.12 This training system should help to understanding of Local Area Network (LAN) including fundamental soften working.

50.13 It should assist for knowledge of all network layers, cable designing and building of complete network of computers.

50.14 Students can study of various topologies using different standards given by IEEE with actual connections made in different topologies and data can be transferred.

50.15 It should have provision to understand protocols, topologies used in networking, measurement of error rate, through put and effect of errors on protocols.

50.16 It should have PC to PC using RJ-45 Connector, Star topology using RJ45 Connector, Ring topology using DB9 Connector.

50.17 This training system should have software by which student can study Star & Ring selection, Protocols: CSMA /CD, CSMA /CA, Stop N Wait, Sliding Window, Token Bus, Token Ring, Packet size :128,256,512,1024, 2048,4096,8192,16384InterPacketdelay:1000– 5000ms, Error generation: Acknowledgment lost, bad packet, auto error generation, Complete analysis of Network & Protocols, Real time Graphic representation of data ons/w screen with packet details, Network details like, Indication of computer name,IP address, MAC address, Port number, status of network, Network & protocolanalysis like Indication of packet serial number, file name, file size, file number,receiver name, receiver IP address, total packets, packet length, time out,protocol, topology, receiver, MAC address, port number, file send start time, filesent completion time, transmission time data rate(Mbps), percentage error.

50.18 Trainer should be RoHS complained. It should be compact, lightweight and housing should be made of ABS material.

50.19 It should come with technical chart pasted on it to learn and understand more about applications and technical details.

51. Laptop latest configuration

51.1 Basic Indicative Diagram

51.2 11th Generation Intel® Core™ i7-11370H Processor (12MB Cache, up to4.8GHz)

51.3 Windows 10 Home Single Language, English, Inbuilt MS office 2019, Antivirus 3 Yrs

51.4 NVIDIA® GeForce® MX450 with 2GB GDDR5 graphics memory

51.5 16GB DDR4 3200MHz

51.6 1TB 256Gb SSD M.2 PC Ie NV Me Solid State Drive

51.7 Monitor TFT LED 15.5”

52. Laser jet Printer

136.1 Basic Indicatie Diagram

136.2 Specifications

• Printer Type - LaserJet ; Functionality - Single Function (Print Only);
Printer Output – Black & White only •
Connectivity - USB • Compatible Laser Toner - HP 88A Black Original LaserJet Toner Cartridge; Page Yield – 1500 pages; comes with HP Black LaserJet Toner cartridge • Warranty - 1 year from the date of purchase • Pages per minute - 18 pages ;
Cost per page - Rs 2 (Black & White) - As per ISO standards
• Page size supported - A4; A5; A6; B5; postcards; envelopes (C5, DL, B5) ;
Duplex Print – Manual; Print resolution - Up to 600 x 600 x 2 DPI (1200 DPI effective output)
• Duty Cycle - Up to 5,000 pages per month

53. Internet Broadband and Connection

Choose broad band OFC connection with at lest 100mbps or as per individuals requirements.

54. Electronic circuit simulation Software with five user licenses. Circuit Design and Simulation Software with PCB Design with Gerber and G Code Generation, 3D View of PCB, Breadboard View, Fault Creation and Simulation.

21.2 The software should have facility of circuit simulation and PCB design of analog, digital and mixed electronic circuits with their PCB layouts.

21.3 It should have a library of at least 20 thousand components.

21.4 It should support Spice, VHDL, Verilog, Verilog AMS and System C, Create Digital filters in System C and run in software, add MCUs in System C to the software.

21.5 It should also have facility to analyse SMPS, RF, Communication, Power Electronics and Optoelectronic circuits.

21.6 The software must be able to simulate PIC, AVR, 8051, ARM and Arduino MCUs, in digital or mixed circuit environment.

21.7 It should have features to generate and debug MCU code using the integrated flow chart tool and test microcontroller applications in a mixed circuit environment.

21.8 The software should have facility of fault creation in the components, automatic calculation of the component value for the optimization of designed circuit.

21.9 It should support digital circuit simplification of digital logics and the implementation Of logic gates using Quine-Mccluskey method and Karnaugh-Map.

21.10 The software should support. symbolic analysis: automatic creation of closed form expressions and for DC, AC and Transient analysis of linear circuits.

21.11 The software should support ADCs, DACs with SPI, I2C, SPI bus simulation, PM bus, SM bus simulation.

21.12 It should also provide facility to study two-port parameters of networks (S, Z, Y and H), DC Transfer Characteristic with Nested sweep option and Parameter Sweeping function to study the response of components. Functions to plot the frequency response, Phasor Diagram, Nyquist Diagram and Noise Analysis. Linux simulation on ARM MCU should be possible.

21.13 Pre-recorded (.wav) files can be used as input in circuits and transient analysis results can be converted to .wav files or played using the sound system of computers.

21.14 All five users perpetual license of the software should support either the digital online access, and simulation or the license protection should be supported through USB hardware dongle and have facility to upgrade in future.

21.15 Should create Multilayer PCB layouts of circuits, with automatically placed and routed components. All components in software should be "PCB-ready" and have associated footprints which user can review and change on a component spreadsheet.

55. Different types of electronic and electrical cables, connectors,Sockets, terminations.

Consumable items

56 Different types of Analog electronic components ,digital lCs, power electronic components, general purpose PCBs, bread board, MCB, ELCB

Consumable items

57. SMD soldering & De soldering Station with necessary accessories

SMD Soldering & De soldering Station Digitally Calibrated Temperature Control SMD Soldering & disordering Power Consumption: 60 Watts I/P Voltage: 170 to 270 V De-soldering: 70 Watt Temperature Range: 180 to 480º Centigrade Power Consumption: 270 Watts Hot Air Temperature: 200 to 550º Centigrade

58. SMD Technology Kit. SMD Soldering & De soldering Station with necessary accessories.

58.1 Basic Indicative Diagram

Technical Specifications:

SMD component identification board with SMD Components, Resistors, Capacitors, Inductors, Diodes, Transistors & IC's packages. Proto boards with readymade solder pads for various SMD Components. SMD Soldering Jig.

58.2 SMD Identification Board 1 no.
58.3 Proto BOARDS 2 no's each
58.4 Discrete Surface Mount
58.5 SOP
58.6 SO
58.7 Through Holes
58.8 Chip Scale
58.9 SMD Soldering Jig 1 no.
58.10 SMD Soldering Iron 1 no.
58.11 SMD components Resistors , Capacitors, Diodes , Transistors 10 no. each
58.12 Tweezers 2 no. Manual 1 no.

59. Microcontroller kits(8051) along with programming software (Assembly level Programming) With Six important different application modules.

1. Input Interface Switch, Matrix Keypad, ASCII Keypad

2. Display LCD, Seven Segment, LED Matrix

3. ADC & DAC

4. PC Interface module

5. Motor DC, Stepper, Servo

6. DAQ

Core 8051 MCU clocked at 11.0592 MHz., supporting both programming modes Keypad and computer ,LCD for both programming and run mode, ready to run programmer to support family of controllers AT89C52 ,DC Power Supplies +12V, - 12V, +5V & -5V, Breadboard to make circuits, Learning content through simulation Software and following application modules

1. Input Interface : 4x4 Matrix Keypad, ASCII Key PAD, Four Input Switch

2. Display 16X2 LCD, Seven Segment, LED Bar Graph

3. ADC/DAC with ADC/DAC0808

4. PC Interface: RS232 & USB

5. Motor Drive: DC, Servo, Stepper

6. DAQ: 4ch analog 10bit, 22 DIO resolution,6MHz Frequency Counter (square wave), DAQ with PC

interface software

Learning content through simulation Software

Embedded System: Module on Embedded system should cover following topics: Basics: Definition, Characteristics, Architecture, Applications, Categories: Stand Alone Embedded System, Real-Time Embedded System, 8051 Microcontroller: Microcontroller, Architecture, Features, 8051Pinout and Details, Registers and SFR, Memory Map, Instruction Set, Addressing Mode, Timer and Counters, Interrupts, Serial Communication 8051 Peripheral Interfacing: Switch Interface, Seven Segment Display Interface, LED interface, LCD Interface

60. Sensor Trainer Kit Containing following Sensors

Government of Maharashtra Directorate of Vocational Education and Training, Maharashtra

a) Air humidity and Temperature
b) RTD
c) Atmospheric Pressure
d) Air Quality
e) Smoke Detector Sensors
f) Limit Switch
g) Photo sensors
h) Capacitive displacement**.**

IoT enabled Android based 7" Graphical touch LCD with inbuilt cortex processor & DAQ for acquiring analog data and software for viewing the output waveforms with USB storage and HDMI output. Ethernet port to connect real world. Inverting, Non – Inverting, Power, Current, Instrumentation and Differential Amplifier, F to V, V to F, I to V, V to I Converter, High Pass and Low Pass Filter, Buffer, LED, Buzzer, LED Bar Graph, Touch Switch Included Sensors :RTD,NTC Thermistor,LM35, Photovoltaic, Air humidity and Temperature, Gas(Smoke), Air Quality, Atmospheric Pressure, Limit switch, Capacitive displacement.

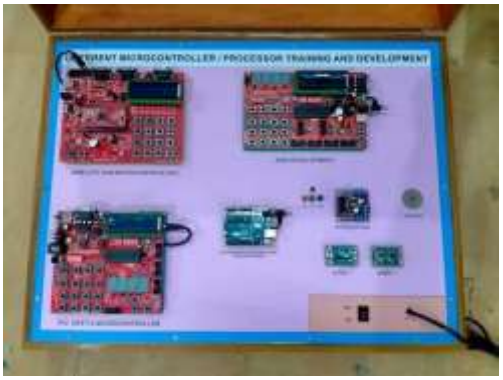
61. Different types of electronic and electrical cables, connectors, sockets, terminations.

As Per DVET, Maharashtra State SPECIFICATION FOR TRADE ELECTRICIAN VER-ELE-01, ITEM NO - 87, 88

Consumables Material

62.Different Microcontroller/Processor Training and Development Platform for AVR, PIC, ARM and Adriano.

Basic Indicative Diagram

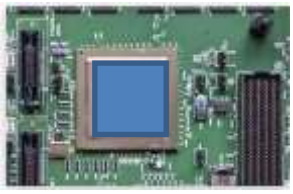


62.1	MCU PIC16F877A, 4MHz, Onboard programmer will program PIC Devices, USB Port
62.2	MCU ATMEGA8515, 8MHz, onboard programmer will program ATMEGA series microcontroller,USB Port
62.3	MCU LPC2148, 12MHz, LED,- 8Nos, ADC 10 bit- 10 NOs, DAC 10bit
62.4	USB and RS232, RTOS support
62.5	JTAG Connector, USB2.0
62.6	On board Zig bee, l2C, SPI, RTC, DC motor, PWM, Sensor LM35
62.7	Display 16X2 LCD Display
62.8	Motor Drive: L293D 6O0mA (5-12V)
62.9	Programmer USB interface
62.10	Microcontroller ATmega328p (Arduino Based), 16MHz, Digital I/O Pins 14(of which 6 provide PWM output)
62.11	Flash Memory : 16KB (of which 2KB used by boot loader)
62.12	Each platform should have Bread DC Power Supplies +12V,-12V, +5V & - 5V,Breadboard to make circuits.

Learning content through simulation Software

63. Internet of Things Explorer Trainer

63.1 Basic Indicative Diagram



63.2 Processor: 64bit ARMv7 with 1GB RAM, Memory 32GB ,

63.3 OS: Open source Linux

63.4 Connectivity: Wireless LAN, Bluetooth, Zig bee, USB & Ethernet, HDMI interface

63.5 1.77" Color TFT LCD

63.6 Driver for Stepper and DC Motor

63.7 16 bit Analog Input, RTC and 4- 20mA input.

63.8 Zig bee:2.4GHz

63.9 Sensors: Temperature and Humidity, Air Quality, Soil Moisture, Ambient Light, Soil/Watertemperature, PIR Sensor.

63.10 GSM lot Gateway - Quad-Band 850/900/1800/1900 MHz, GPRS multi-slot class Control via AT commands.

63.11 Explore physical and application layer protocols like RS232, RS485, GSM, Ethernet and MQTT, Co AP, HTTP, FTP.

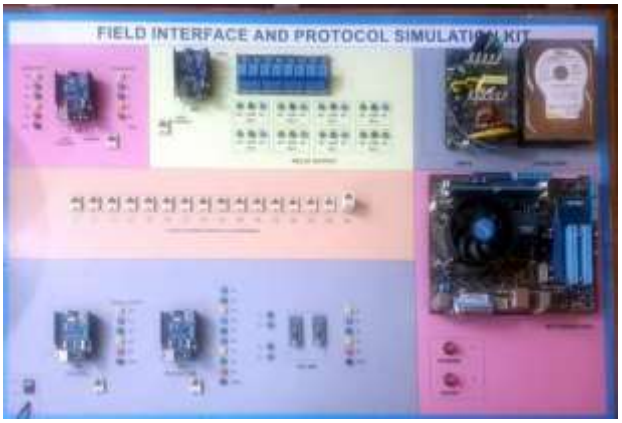
63.13 Cloud/server configuration includes HTML, Java, php and my SQL.

63.14 IoT Node: Wireless 2.4GHz Zig bee, 5 Analog Inputs and at Iea5t 3 Digital Outputs, At least one I2C Channel, support OTA.

63.15 Online Cloud/Server Services for 2 years. Battery 3.7V/4400mAH with Solar Panel, USB interface.

64. Field Interface and Protocol Simulation Kit

64.1 Basic Indicative Diagram



A) : HARDWARE 1. A console including with Branded Desktop
2. Computer with Windows Operating System
3. Ethernet Devices with Isolated Supply and port
4. 4 AIi (0.1% FSR), 4 AO (0-10VDC), Ethernet Port
5. 8 Relay Outputs, Ethernet Port
6. 8 Pulse Outputs, Ethernet Port
7. 8 Digital Inputs, Ethernet Port
8. 4 RS485 Slave ports, 1 Ethernet Port – Qty 4
9. 16 Port Ethernet Switch for networking of field Ethernet devices
10. SMPS to power up multiple Ethernet based field simulation devices
11. Required Connectors, Switches and LED indicators for Field Interface circuits such as Digital Inputs, Relay Outputs, Analog Inputs, Analog Outputs, Pulse Signals

65. Solar Power Lab

65.1 Basic Indicative Diagram

65.2 The System Should have following Specifications:

65.2.1 Training system control panel should have rating of 500 VA and it should be used as solar training system and also power generation.

65.2.2 Training system control panel, powder coated MS of size not less than 950 mm(L) x 310 mm (D) x 650 mm (H) & should have built in digital meters of size 96 mm x 96 mm

65.2.3 3.5 digit LED Dc Digital Voltmeter – 2 Nos (Bat & Panel)

65.2.4 3.5 digit LED Dc Digital Ammeter – 2 Nos (Bat & Panel)

65.2.5 3.5 digit LED 3 line multiparameter meter for measuring ACV, ACA, Power and frequency-01 No

65.2.6 Also 2 separate backlit LCD display are to be provided.

65.2.7 16 x 2 alphanumeric LCD for Inverter details such as Vinverter, Vmain, Vbattery, load %, OL/SC ; Low Bat ; Charging mode status and 20 x 4 alphanumeric LCD for MPPT Charge Controller details such as Vbat, Vpanel, Apanel, Abat charging, Total energy

65.2.8 Control panel with BS-10 (10A, 30A) terminals for making the connection and protection for battery & solar panel BNC Output for CRO

65.3 Should be able to perform analysis of temperature and dust effect on Solar Power Generation

65.3.1 DSP Microcontroller based inverter technology

65.3.2 Single and dual axis tracking system

65.3.3 Training System includes:

65.3.3.1 250Wp Solar Panel: 2 Nos.

65.3.3.2 Solar Battery (C10 type tubular) 100Ah: 2 Nos.

65.3.3.3 PWM based MPPT Charge Controller: 1 No.

65.3.3.4 Inverter - 500VA: 1 No.

65.3.4 Solar Panel: 250Wp, Voc : 37V, Isc : 7.75A, Vmp : 30V, Imp : 7.14A

65.3.5 Control Panel:

65.3.5.1 Capacity: 500VA,
65.3.5.2 Input Voltage: 120-290V AC
65.3.5.3 Output Voltage on Mains mode: Same as Input
65.3.5.4 Output Voltage on UPS mode: 210-240V
65.3.5.5 Output Frequency on UPS mode: 50Hz ±0.1Hz
65.3.5.6 Output waveform on Mains mode: Same as Input
65.3.5.7 Output waveform on UPS mode: Pure
Sine wave (for Silent operation of mixed load)
65.3.5.8 Battery Charging Current: 12A
65.3.5.9 Charger: 4 Stage
65.3.5.10 Efficiency at full load: >80%
65.3.5.11 UPS Overload / UPS Short Circuit: Yes
65.3.5.12 Technology: DSP Microcontroller Based Design
65.3.5.13 MPPT Auto Tracking: Yes
65.3.5.14 MPPT Auto select: Battery & Panel
65.3.5.15 MPPT Reverse Protection: Battery & Panel
65.3.5.16 MPPT High Voltage Protection: Battery & Panel
65.3.5.17 MCB: C Type 6A
65.3.6 Charge Controller:
65.3.6.1 Solar PV Module: 24–50V
65.3.6.2 Current: 20A
65.3.6.3 Battery Voltage: 24V
65.3.6.4 Technology: PWM based MPPT
65.3.6.5 Charging Stage: Bulk, Absorptions and Float
Automatic panel and battery selection
Output and input current limiting at 25A
65.3.6.6 Priority solar charging facility
65.3.7 Setup should support to perform following experiments:
65.3.7.1 I-V and P-V Characteristics of P-V Module
65.3.7.2 Vmp, Imp, MPP and Fill factor measurement of Solar PV Module

65.4 Protections:
65.4.1 Battery reverse
65.4.2 Panel reverse
65.4.3 Battery high voltage
65.4.4 Panel high voltage
65.4.5 Both battery & panel are high & reverse voltage same time
65.4.6 Overload and Short circuit
65.4.7 No surge current during connection (for zero spark
while connecting battery & panel)

65.5 Inverter:
Isolated sensing of Mains: This will ensure that even if Phase-Neutral connection is reversed at the input side there will not be any electric shock on the PCB / battery 440V is applied to the AC input, it will not fail. It will indicate high voltage cut-off and restart when voltage is normal if AC mains is given to the inverter output, it will not fail

65.6 Standard Accessories:
65.6.1 Operating and Learning manual - printed manual & in CD
65.6.2 System should be provided with all standard accessories to perform the experiments including Gravity Hydrometer and Rheostat (100 ohms / 8 Amp)
65.6.3 Free On Line Technical support for all registered users

65.6.4 Patch cords set of 11, Mains cord, BNC - BNC, Fuses

65.6.5 Solar DC Cable (4sq mm) : 4 x 10 meters with Solar connector at one end for Solar Panel & Pin type lug on other end for connecting on panel

65.6.6 Battery DC Cable (4sq mm) : 4 x 1 meter with connector at one end for Battery & Pin type lug on other end for connecting on panel

65.7 Electric Supply Specification: 240V AC 50 HZ

65.8 Space Requirement for Installation:

65.8.1 Overall Length: 900 mm (Approx.)

65.8.2 Overall Width: 285 mm (Approx.)

65.8.3 Overall Height: 600 mm (Approx.)

66. Solar PV Module Analyzer

Product Specification

- Micro-controller Based with 16X2 LCD,
- PC Interface, mains & battery operated.
- Capable to measure Open Circuit Voltage and Short Circuit Current, Maximum Voltage and Current at Maximum Power DCV Range 0-50V,
- DCA Range 10A, Battery : 9V

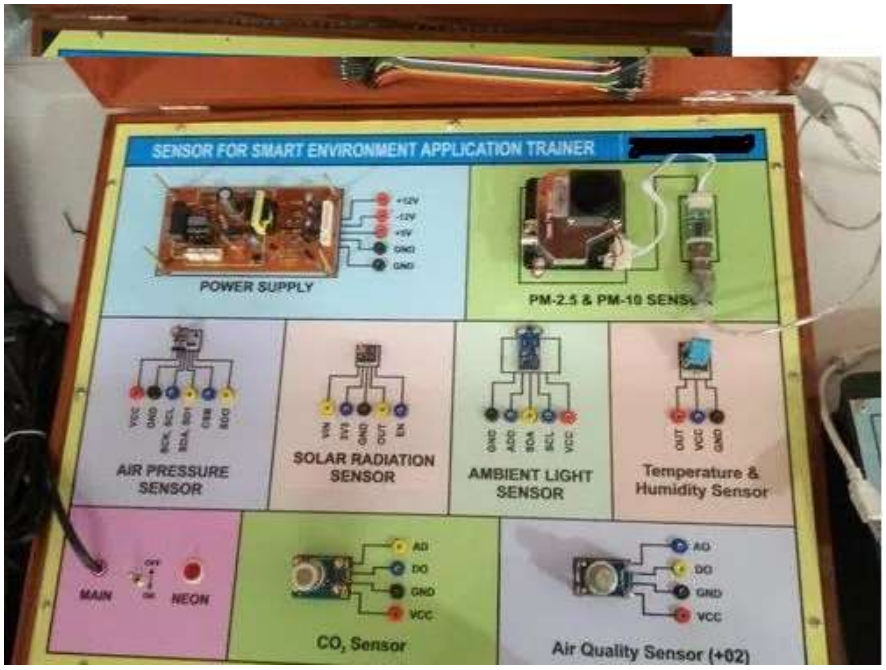
67. Wireless Communication modules for interfacing with microcontrollers Trainer

a) RFID CardReader
b) FingerPrint
c) Zigbee
d) GPS
e) GSM
f) Bluetooth
g) WiFi

Practical -Sensor Wise Training Manual

Core 8051 MCU clocked at 11.0592 MHz, supporting both programming modes Key Pad and PC ,LCD for both programming mode and run mode, ready to run programmer to support family of controllers AT89C51/52 & 55 ,DC Power Supplies +12V, -12V, +5V & - 5V,Breadboard to make circuits, detailed learning content through simulation Software and following application modules : RFID Card Reader ,Finger Print, Zigbee, GPS, GSM, Bluetooth and WiFi

68. Sensors for Smart Environment Application



The system should be microcontroller based.
Gateway should be worked with battery and also have Wifi connectivity for real time data acquisition.
Study of different types of Environment sensor
Testing and understating the Types of Sensor CO2 Sensor, O2 Sensor, Air Temperature & humidity Sensor, Atmospheric Pressure Sensor, Solar Radiation Sensor, PM2.5 and PM10 Sensor, UV Index Sensor on IoT Explorer

A) : ARDUINO MICROCONTROLLER BOARD
1. Arduino Uno Microcontroller board based on the ATMEGA328P
2. 14 Digital Input / Output pins (of which 6 provide PWM output)
3. 16 MHz Ceramic Resonator
4. USB Port 5. Power Jack – 9V DC, 1A

B) : MODULES AND HARDWARE
1. 20 X 4 - LCD Display
2. ESP32 Wifi Module
3. 2 mm interconnection Sockets

C) : SENSORS & : OTHER COMPONENTS
1. CO2: Range: (0-2000ppm) Sensor
2. O2: Range: (0-25%) Sensor
3. Air Temperature & Humidity Sensor DHT11
4. Atmospheric Pressure Sensor BMP180
5. PM2.5 and PM10 Air Quality Dust Pollution Sensor (UART and PWM output)
6. Solar Radiation Sensor SDS011 7. UV Index Sensor

69. Sensors for Smart Parking

All should be compatible with Sensor Training Platform & IOT Explorer mentioned above: CCTV Camera, Motion Sensor, RFID, Relays, Hooter, Magnetic Hall Sensor, Ultrasonic, and Application Software for SMART Dashboard

The system should be microcontroller based.

Gateway should be worked with battery and also have Wifi connectivity for real time data acquisition.

70. Sensors for Smart Water & Waste water Management & Monitoring

- All should be compatible with Sensor Training Platform & IOT Explorer mentioned above: Conductivity Sensor, PH Sensor Cupric (Cu2+), Silver (Ag+), Lithium (Li+) with 10, 100 and 1000 ppm solution calibration kit. Level Sensor, Flow Sensor, Ultrasonic Sensor &Temperature.
- Microcontroller : ATMega2560
- Digital I/O pins, Analog Input pins, UART,I2C communications
- Power Supplies : 0-5V
- Variable potentiometer : 1 no. (10K)
- Programming USB : 2.0, Flash memory : 32 KB
- SRAM : 2 KB, EEPROM : 1 KB
- Clock speed : 16 MHz, Controller operating voltage : 5V DC
- Conductivity Sensor, PH Sensor Cupric (Cu2+), Silver (Ag+),Lithium (Li+) with 10, 100 and 1000 ppm solution calibration kit.
- Level Sensor, Flow Sensor Ultrasonic Sensor & Temperature.
- The system should be microcontroller based.
- Separate structure should be provided for waste water management.
- Gateway should be worked with battery and also have Wifi connectivity for real time data acquisition.

71. Weather Monitoring System

v

The system should support to perform following experiments:

- System should have Interactive SMART Dashboard for display information

A) : ARDUINO MICROCONTROLLER BOARD

1. Arduino Uno Microcontroller board based on the ATMEGA328P
2. 14 Digital Input / Output pins (of which 6 provide PWM output)
3. 16 MHz Ceramic Resonator
4. USB Port 5. Power Jack – 9V DC, 1A

B) : MODULES AND HARDWARE:

1. 20 X 4 - LCD Display
2. GSM Module – 2.4 GHz
3. ESP32 Wifi Module
4. 12 V Solar Charger
5. 2 mm interconnection Sockets

C) : SENSORS & OTHER COMPONENTS

1. Temperature and Humidity Sensor DHT 22 Temperature Range : -10°C to 90°C, Relative Humidity Operating Range 0 to 95%
2. Wind Speed

Sensor Speed : 0 to 20m/S Resolution 1m/S

3. Wind Direction Sensor
4. Rainfall Bucket Collector
5. Solar Radiation Sensor – SOS 011
6. UV Index Sensor
7. Atmospheric Pressure Sensor - BMP 180
8. Air Quality Detection Sensor - PM 2.5

72. Smart Solar Street Lighting Training Platform

The system should support to perform following experiments:

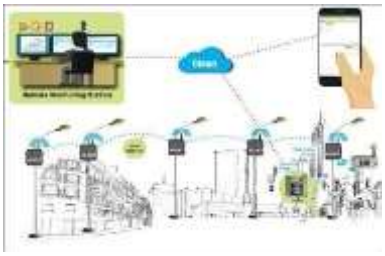
- System should have Interactive SMART Dashboard for display information
- Should have IoT gateway with Zigbee, USB and WiFi connectivity.

Microcontroller based Wireless connectivity using WiFi TFT LCD Display to display various parametersConnectivity: USB (04 nos.)

The system should come with following Sensors

- Temperature,
- Humidity,
- Air Quality,
- PIR, and Auto diming Solar Panel: 40 W (01no), Polycrystalline type,
- Battery: SMF type for rating 12V, 26Ah (01no)
- Charge Controller: PWM type
- LED Light: 10-Watt (01no)
- Application Software for SMART Street Light Dashboard

73. IoT based Smart Streetlight System



The system should support to perform following experiments:

• System should have Interactive SMART Dashboard for display information

A) : ARDUINO MICROCONTROLLER BOARD

1. Arduino Uno Microcontroller board based on the ATMEGA328P
2. 14 Digital Input / Output pins (of which 6 provide PWM output)
3. 16 MHz Ceramic Resonator
4. USB Port 5. Power Jack – 9V DC, 1A

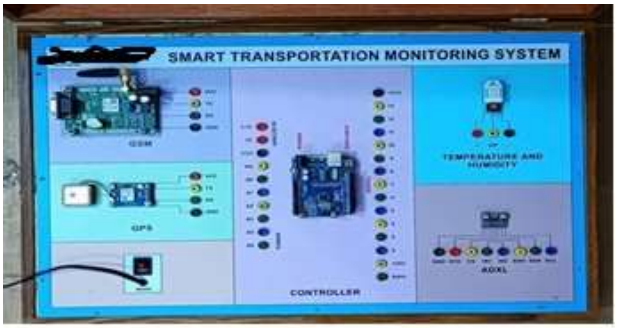
B) : MODULES AND HARDWARE:

1. 20 X 4 - LCD Display
2. Quad Band GSM/GPRS Module – 2.4 GHz
3. ESP32 Wifi Module
4. 2 mm interconnection Sockets

C) : SENSORS & AMP - OTHER COMPONENTS

1. 1Phase Digital Energy Meter 2.
1 Phase 223V Contactor
3. 1 Phase MCB
4. 1 Phase 220V MCB
5. Digital Timer Programmable Controller
6. 1 Phase 220V Automatic Over/Under Voltage Protector with Over Current Protection
7. Serial TTL to RS485 Converter – for RS Communication Port
8. 4 Digital Inputs for Door sensors as well as contactor feedback
9. 3 Relay outputs for switching of streetlight circuits
10. Door Sensor
11. LDR Sensor
12. SMC box with IP65 and IK10 ratings

74. Smart Transportation Monitoring System



A) : RASPBERRY MICROCONTROLLER BOARD – PI-4

1. Processor : 64bit, ARMv7
2. RAM - 1 GB
3. Memory - 32GB
4. OS: Open Source Linux
5. Connectivity: Dual-Band 2.4/5.0 GHz Wireless LAN Bluetooth 5.0 USB Interface – USB 2.0 – 2 Ports, USB 3.0 – 2 Ports, Gigabit Ethernet
6. Video and Sound 2 × micro HDMI Interface ports (up to 4Kp60 supported) 4-pole stereo audio and composite video port Output
7. Power - 5V, 3A DC via USB-C Connector

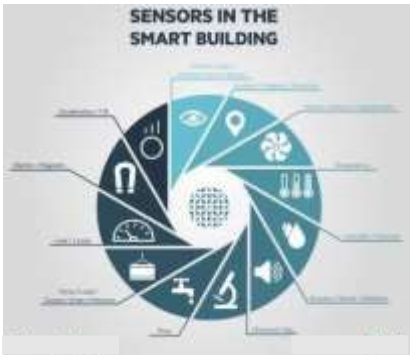
B) : SENSORS:

1. Temperature and Humidity Sensor – DHT11
2. Accelerometer Meter
3. GPS Speed Tracker with Input Supply : 12V DC
4. Audio Buzzer

C) : MODULES AND HARDWARE:

1. 20 X 4 - LCD Display
2. GSM Modem Module : Quad-Band 850/900/1800/1900MHz
3. GPS Module : GPS Frequency 1575.45 MHZ
4. ESP32 Wifi Module
5. 2 mm interconnection Sockets ESP32 Wifi Module

75. Sensors for Smart Building



A) : ARDUINO ATMEGA 2560 MICROCONTROLLER BOARD
1. Atmega 2560 Arduino Microcontroller board
2. Operating voltage: 5V
3. Input voltage (recommended): 7-12V
4. Input voltage (limits): 6-20V
5. Digital Input / Output pins : 54 (of which 14 provide PWM output)
6. Analog input pins : 16
7. DC current per I/O pin : 40mA
8. DC current for 3.3V pin : 50mA
9. Flash Memory 256 KB, 8KB used by bootloader
10. SRAM : 8 KB
11. EEPROM : 4 KB
12. Clock Speed : 16 MHz
13.Mini USB Port
14.Power Jack – 9V DC, 2A

B) : MODULES AND HARDWARE
1. 20 X 4 - LCD Display
2. 4 Channel Relay
3. ESP32 Wifi Module
4. 2 mm interconnection Sockets ESP32 Wifi Module

C) : SENSORS AND MAIN PARTS
1. PIR Motion Sensor
2. RFID Reader Writer Sensor RC522 with RFID Keychain and RFID Cards
3. Smoke Detector Sensor MQ2
4. Fire Sensor
5. LPG Gas Sensor MQ6
6. Air Quality Sensor – MQ135
7. Ambient Temperature & Humidity Sensor – DHT11
8. CO2 Sensor
9. LDR Light Sensor
10. Touch Panel Sensor
11. Hooter
12. CCTV Camera
13. 8 Button Smart Capacitive Touch Panel Switch Board
14. Four 5 A sockets to control 3 Light bulbs and One Fan

15. 9 Inch Fan with Regulator
16. 16A AC Plug
17. 3 Infrared Channel Controller to control appliances using Infrared
18. IR Receiver
19. IR Sender
20. P2N2222A Transistor

Government of Maharashtra

Directorate of Vocational Education and Training, Maharashtra State

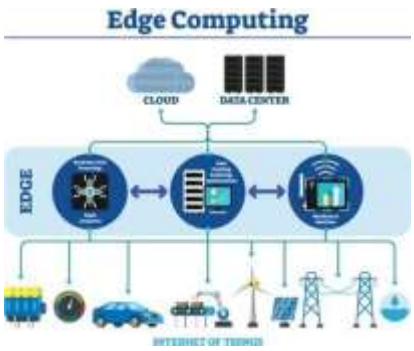
SPECIFICATION FOR TRADE IoT TECHNICIAN (SMART CITY) INTERNET OF THINGS NSQF LEVEL 4

76. IoT Data Acquisition Systems & Protocol Converters

A) : HARDWARE

1. Connectivity to Cloud (IBM, Microsoft, Amazon)
2. 4 Analog Inputs (0.1% FSR)
3. 8 Pulse Inputs (up to 1 kHz)
4. 8 Digital Inputs
5. 4 Relay Outputs
6. Ethernet IOT DAQ
7. Wi-Fi IoT DAQ
8. Cellular (GSM / GPRS) IoT DAQ
9. MODBUS RTU to MODBUS TCP
10. 24 VDC Isolated Power Supply
11. 4 Isolated MODBUS RTU Master Port
12. Serial to Ethernet Converter
13. Serial to Wi-Fi Converter
14. Serial to GPRS Converter
15. Air Humidity & Temperature Sensor (DHT11)

77. IoT EDGE Computing Device



A) : HARDWARE

1. Embedded SCADA for 50Tags
2. 24 VDC Isolated Power Supply
3. 4 MODBUS RTU Master
4. 32 GB Built in SD Card
5. 1 Wi-Fi Port
6. 1 Ethernet Port
7. 1 GPRS Port
8. 4 Analog Inputs (0.1% FSR)
9. 8 Pulse Inputs (up to 1 kHz)
10. 8 Digital Inputs 11. 4 Relay Outputs

78. Cloud Based IoT SCADA

A) : HARDWARE

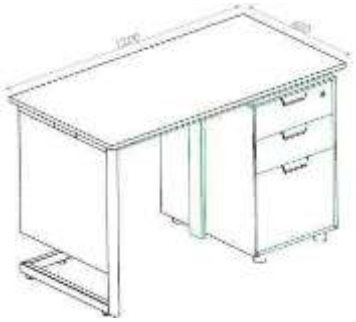
1. 50 Tag License for Cloud based SCADA to connect IoT Devices
2. 24 VDC Isolated Power Supply
3. MODBUS RTU Master

IOT based Smart Systems with Device Manager with

- 1 Wi-Fi Port
- 1 Ethernet Port
- 1 GPRS Port
- Analog Inputs
- Pulse Inputs
- Digital Inputs
- Relay Outputs

4. IO Server
5. Alarm Server
6. Historian and Reporter

79. Instructor's table



79.1 Basic Indicative Diagram
79.2 Manufacturing, Supplying and Installation of Pre-laminated Instructor Table as per the following design, specification, manufacturing process and tests.
79.3 Dimensions: Overall size of 1200mm (W) X 600mm (D) X 735mm (H).
79.4 Construction:
79.4.1 Top Work surface:
18mm thick pre-laminated board as per IS:12823 of approved shade with2mm thick PVC edge banding all over the work surface edges.
79.4.2 Understructure:
Rectangular Frame Fabricated component in 1.2mm thick CRCA (IS: 513).
79.4.3 Leg:
79.4.3.1 Fabricated component in 38mm x 25mm x 1.2mm thick CRCA ERWTube (IS: 7138).
79.4.3.2 Plastic Cap for Cable travel- Injection Moulded Polypropylene.
79.4.3.3 Leveler glide for Leg- Nylon 6 and MS Bolt.
79.4.4 Storage Pedestal:
79.4.4.1 Out of 3 drawers (Box + Box + File), the bottom most will be the filedrawer and top drawer shall have a pencil tray. The storage unit shall
also have suitable sliding arrangement, handle locking facility, etc.
79.4.4.2 Shell- 0.6mm thick CRCA (IS: 513).
79.4.4.3 Drawer Tray- 0.6mm thick CRCA (IS: 513).
79.4.4.4 Drawer Front- 0.8mm thick CRCA (IS: 513).
79.4.4.5 Frame Assembly- 1.2mm thick CRCA (IS: 513).
79.4.4.6 Lock- 10 Lever Cam Lock central locking mechanism.
79.4.4.7 Handle- Injection Moulded Polypropylene.
79.4.4.8 Leveler- Nylon 6 and MS Bolt.
79.5 Wire Management:
79.5.1 Entry of wires into the Table shall be possible from the floor
79.5.2 Horizontal Wire Carrier- 0.7mm thick CRCA (IS: 513)
79.5.3 Vertical Wire Carrier- 0.8mm thick CRCA (IS: 513)

79.5.4 (Only provision of carrier for electrical/ data slots below the work top shall beprovided)
79.6 Finish:
79.6.1 Epoxy Polyester Powder to the thickness of minimum 50 – 60 microns (+/-10).
79.6.2 Process:
The body including understructure, framework, legs, storage pedestal including fittings involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of 50 – 60 microns (+/-10). The material is then oven baked with a controlled temperature of 180 deg.C to 200 deg.C.
79.6.3 Tests:
The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity,Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding,detergents, acid/ alkali. The test reports shall be submitted along with the tender.
79.7 Colour:
79.7.1 The colour of the PLB shall be Silver Grey / Teak and Core Ash/ Grey forframework.
79.7.2 Final colour scheme will be approved by DVET at the time of placement oforder. Manufacturer to furnish various colour schemes available with them.
79.8 Manufacturing Process:
79.8.1 The complete unit shall be as per manufacturer's specifications and shall besubmitted along with the tender.
79.8.2 Raw materials (Wood working): 1) Plain Particle Board (PPB), 2) Medium Density Fibre Board (MDF), 3) Pre-laminate Board (PLB), 4) Decorative Laminate (DL), 5) Fabric and 6) Lipping (PVC lipping).
Process (Wood working): MDF board from approved supplier -> Wood Cutting (cutting from mother board 600mm x 2400mm sheet to the desired size on Panel saw machine with no sharp edges, no glue marks, no scratches, no machine marks and no cracks at drill hole) -> Lamination (Hot lamination adhering Decorative laminate to MDF board using approved make adhesive)
-> Sizing/ Routing (fine sizing and setting curvilinear shapes) -> Lipping/ Edge banding (adhering PVC lipping on MDF board using hot melt glue under heat and pressure) -> Finishing -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).
79.8.3 Raw materials (Metal working): 1) Stainless Steel (Nickel and Chromium added to prevent steel from rusting), 2) Mild steel and 3) Epoxy polyester powder (for powder coating).
Process (Metal working): CRCA sheet from approved supplier -> Notching (cutting at the edge and punching holes, shearing, turret punching/ press operation, deburring of punched sheet) -> Metal forming (blending for the

purpose of different applications, sheet bending) -> Assembly/ Sub-Assembly(for welded all components get assembled and for knock down sub-assemblytakes place. CO2 welding and spot welding is done) -> Pre-treatment (8 step process including anti-rust surface treatment) -> Powder coating (surface coating applied in the form of powder and on curing produces a protective coating, examination of test coating specimen for blisters, flaking and corrosion) -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch)

79.8.4 Raw materials (Metal working): 1) Aluminium Extrusion.

Process (Metal working): Aluminium Extrusion from approved supplier -> Cutting of Aluminium extrusions to desired size -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing anddispatch).

79.8.5 The manufacturing processes given are generalized. Need to considerwherever it is applicable as per the Specifications of the product.

79.8.6 All raw materials for manufacturing process shall be as per relevant IS code.

79.9 Size and Weight:

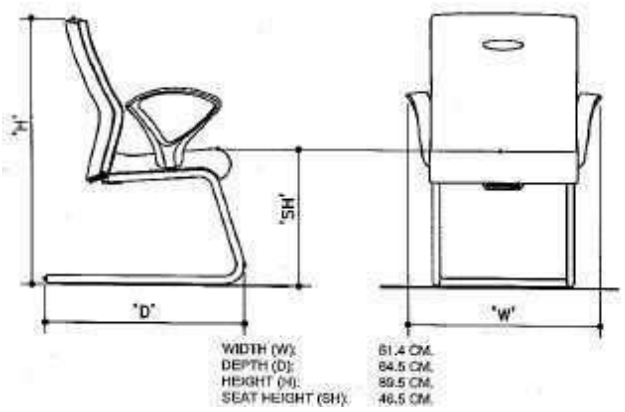
79.9.1 Overall Length: 1200 mm

79.9.2 Overall Width: 600 mm

79.9.3 Overall Height: 735 mm

79.9.4 Net Weight: Minimum 40 - 50 Kg

80. Instructor's chair



80.1 Basic Indicative Diagram:

80.2 Manufacturing, Supplying and Installation of Mid-back Tubular framed Chair for Instructor in the Classroom as per the following design, specification, manufacturingprocess and tests.

80.3 Dimensions:

80.3.1 Overall size of 610mm (W) X 640mm (D) X 850mm (H).

80.3.2 Seat Size: 470mm (W) x 480mm (D) X 450mm (H).

80.3.3 Mid Back size: 475mm (W) x 580mm (H).

80.4 Construction:

3.4.1 Seat and Back Assembly:

Seat and Back Assembly: Seat and back are made up of 12mm thick hotpressedplywood, upholstered with fabric upholstery covers (Fabric colour
shall be approved by DVET) and molded Polyurethane foam. The back foam is designed with contoured lumbar support for extra comfort. The seat has extrathick foam on front edge to give comfort to political area. The polyurethane foam shall be as per manufacturer's specification. Seat durability test (cyclic test) to perform 1,00,000 cycles for a load of 57 Kgs made to free fall on the seat from a height of 25mm.

80.4.2 High Resilience Polyurethane Foam:

The HR Polyurethane foam shall be moulded with density = 45 +/-2 Kg/m3 and Hardness = 20 +/- 2 Kgs on Hampden machine complying to IS:7888 at 25% compression and it should be covered with fabric as per manufacturer'sshade card. The polyurethane foam shall be as per manufacturer's specification.

80.4.3 Armrest:

The one-piece armrests shall be injection molded from black co-polymer Polypropylene. Tested to perform 60,000 cycles for a load of 40 Kgs applied at 10 Deg.

80.4.4 Understructure Assembly

The understructure assembly is a cantilever type powder coated (DFT 50-60 microns) tubular mainframe made of dia 25 +/- 3mm X 2 +/- 1.6mm thk M.S.ERW Tube (IS: 7138).

80.5 Finish:
80.5.1 Epoxy Polyester Powder coated to the thickness of 50 – 60 microns (+/-10).
80.5.2 Process:
The body including tubular framework, support, etc. for Chair involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of 50 – 60 microns (+/-10). Thematerial is then oven baked with a controlled temperature of 180 deg.C to 200 deg.C.
80.5.3 Tests:
The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity,Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding,detergents, acid/ alkali. The test reports shall be submitted along with the tender.
80.6 Colour:
80.6.1 The colour of the Fabric shall be Carbon Black, Milan Red, Copper Moon
80.6.2 Final colour scheme will be approved by DVET at the time of placement oforder. Manufacturer to furnish various colour schemes available with them.
80.7 Manufacturing Process:
80.7.1 The complete unit shall be as per manufacturer's specifications and Flow chart of manufacturing process shall be submitted along with the tender.
80.7.2 Raw materials (Wood working): 1) Medium Density Fibre Board (MDF), 2)Plywood 3) Fabric.
Process (Wood working): Plywood from approved supplier -> Wood Cutting (cutting from 12mm thk. mother plywood 1200mm x 2400mm sheet to the desired size on Panel saw machine with no sharp edges, no glue marks, no scratches, no machine marks and no cracks at drill hole) -> Sizing/ Routing (fine sizing and setting curvilinear shapes) -> Fabric from approved supplier -
> Inspection of fabric -> Fabric cutting to desired shape -> Ironing to cut piece of fabric -> Fabric stapling on the tile -> Fabric pasting to metal tile -> Fabric tile inspection -> Fabric tile plastic wrapping -> Assembly and Packaging (panelassembly, final inspection/ correction if required, packing and dispatch).
80.7.3 Raw materials (Metal working): 1) Stainless Steel (Nickel and Chromium added to prevent steel from rusting), 2) Mild steel and 3) Epoxy polyester powder (for powder coating).
Process (Metal working): CRCA sheet from approved supplier -> Notching (cutting at the edge and punching holes, shearing, turret punching/ press operation, deburring of punched sheet) -> Metal forming (blending for the purpose of different applications, sheet bending) -> Assembly/ Sub-Assembly (for welded all components get assembled and for knock down sub-assembly takes place. CO_2 welding and spot welding is done) -> Pre-treatment (8 step process including anti-rust surface treatment) -> Powder coating (surface

coating applied in the form of powder and on curing produces a protective coating, examination of test coating specimen for blisters, flaking and corrosion) -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).

80.7.4 Raw materials (Metal working): 1) Aluminium Extrusion.

Process (Metal working): Aluminium Extrusion from approved supplier -> Cutting of Aluminium extrusions to desired size -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing anddispatch).

80.7.5 The manufacturing processes given are generalized. Need to consider wherever it is applicable as per the Specifications of the product.

80.7.6 All raw materials for manufacturing process shall be as per relevant IS code.

80.8 Size and Weight:

80.8.1 Overall Length: 610 mm

80.8.2 Overall Width: 640 mm

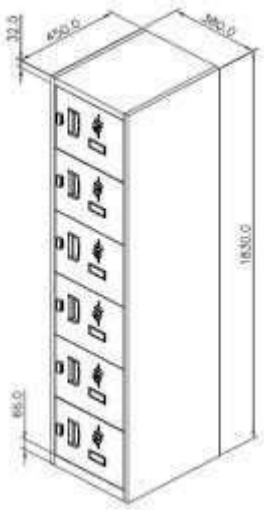
80.8.3 Overall Height: 850 mm

80.8.4 Net Weight: Minimum 6 to 8 Kg

81. Metal Rack

81.1 Basic Indicative Diagram
81.2 Size - 100cm x 150cm x 45cm
81.3 Type - Angle Frame
81.4 Material - Mild Steel Slotted Angle Percolated CRC Sheet
81.5 Surface Finish Powder Coated
81.6 Load Capacity per layer (Kg) 100-150 Kg
81.7 Fitting Adjustable with nut bolt

82. Lockers with 12 drawers standard size



Steel Locker - 24 Compartment
82.1 Basic Indicative Diagram:
82.2 Confirming to IS CODE – 513 (2008), 13871 (1993)
82.3 The overall size of the storage shall be 1520mm (W) x 450mm (D) x 1830mm (H).
82.4 There shall be 4 units of 6 Door Lockers of equal dimensions.
82.5 Combination:
82.5.1 6 Door Base Unit (Size-380mmW)- one number
82.5.2 6 Door Add On unit (Size-380mmW)- Three number
82.6 Construction:
82.6.1 The construction shall be Knock Down Construction.
82.6.2 Overall Construction shall be 0.6mm thick CRCA confirming to IS:513 -2008grade.
82.6.3 Shelf should have uniform load carrying capacity up to 35Kg.
82.6.4 Handle-Aesthetically appealing Snap fit ABS plastic handle.
82.6.5 Label Holder-Plastic label holder should be provided for identification.
82.7 The locking mechanism shall be provided for individual compartment. Lock should be10 Lever cam lock with lock lever. Min. 03 keys for each compartment shall be
provided.
82.8 Finish:
82.8.1 Epoxy Polyester Powder in fire retardant paint coated to the thickness of minimum 50 – 60 microns (+/-10).
82.8.2 Process:
The body including shelves, compartment, framework for door involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of minimum 50 – 60 microns (+/-10). The material is then oven baked with a controlled temperature of 180

deg.C to 200 deg.C.

82.8.3 Tests:

The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity, Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding, detergents, acid/ alkali. The test reports shall be submitted along with the tender.

82.9 Colour:

82.9.1 The colour shall be Prince Grey / Snowbell Grey.

82.9.2 Final colour scheme will be approved by DVET at the time of placement of order. Manufacturer to furnish various colour schemes available with them

82.10 Manufacturing Process:

82.10.1 The complete unit shall be as per manufacturer's specifications and Flowchart of manufacturing process shall be submitted along with the tender.

82.10.2 Raw materials (Wood working): 1) Plain Particle Board (PPB), 2) Medium Density Fibre Board (MDF), 3) Pre-laminate Board (PLB), 4) Decorative
Laminate (DL), 5) Fabric and 6) Lipping (PVC lipping).

Process (Wood working): MDF board from approved supplier -> Wood Cutting (cutting from mother board 600mm x 2400mm sheet to the desired size on Panel saw machine with no sharp edges, no glue marks, no scratches, no machine marks and no cracks at drill hole) -> Lamination (Hot lamination adhering Decorative laminate to MDF board using approved make adhesive)
-> Sizing/ Routing (fine sizing and setting curvilinear shapes) -> Lipping/ Edge banding (adhering PVC lipping on MDF board using hot melt glue under heat and pressure) -> Finishing -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).

82.10.3 Raw materials (Metal working): 1) Stainless Steel (Nickel and Chromium added to prevent steel from rusting), 2) Mild steel and 3) Epoxy polyester powder (for powder coating).

Process (Metal working): CRCA sheet from approved supplier -> Notching (cutting at the edge and punching holes, shearing, turret punching/ press operation, deburring of punched sheet) -> Metal forming (blending for the purpose of different applications, sheet bending) -> Assembly/ Sub-Assembly (for welded all components get assembled and for knock down sub-assembly takes place. CO_2 welding and spot welding is done) -> Pre-treatment (8 step process including anti-rust surface treatment) -> Powder coating (surface coating applied in the form of powder and on curing produces a protective coating, examination of test coating specimen for blisters, flaking and corrosion) -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).

82.10.4 Raw materials (Metal working): 1) Aluminium Extrusion.

Process (Metal working): Aluminium Extrusion from approved supplier -> Cutting of Aluminium extrusions to desired size -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing

82.10.5 The manufacturing processes given are generalized. Need to consider wherever it is applicable as per the Specifications of the product.

82.10.6 All raw materials for manufacturing process shall be as per relevant IS code.

82.11 Size and Weight:

82.11.1 Overall Length: 1520 mm

82.11.2 Overall Depth: 450 mm

82.11.3 Overall Height: 1830 mm

82.11.4 Net Weight: Minimum 60-80 Kg

83. Steel Almirah

Steel Cupboard - Large

83.1 Basic Indicative Diagram:

83.2 Manufacturing, Supplying and Installation of Steel Cupboard having four shelves making five compartments with two door shutter as per the following design, specification, manufacturing process and tests.

83.3 Confirming to IS CODE – 513 (2008), 13871 (1993)

83.4 Dimensions: Overall size of 915mm (W) X 485mm (D) X 1980mm (H).

83.5 Construction:

83.5.1 The construction shall be welded construction with 0.7mm thick CRCA forshelf and 0.8mm thick for sides and back confirming to IS: 513 -2008 grade.

The width of the side sheet shall correspond to the depth of the top. The sidesshall extend between the extreme surface of the top and bottom shelves. Thewidth of the back sheet shall correspond to width of the top. The back shall extend between the extreme surface of the top and bottom shelves.

83.5.2 The length of the top and bottom shall cover the width of the cabinet and thebreadth shall cover the depth of the cabinet made of 0.8mm thick CRCA.

83.5.3 The inside folded edges shall have stiffening. The welded edges should bemachine finished.

83.5.4 All material should be used of relevant ISI specification.

83.6 Configuration (Doors):

83.6.1 Two door shutters shall be made of 0.8mm thick CRCA and all other metalcomponent shall be made of 0.9 mm thick CRCA. CRCA D grade conforming to

IS: 513 -2008. Shutter shall have metal stiffeners suitably welded or riveted to stiffen the door. The centre to centre distance between two adjacent hinges to the right side of the cabinet shall have a hole for the handle and key slot for the key of the lock.

83.6.2 The clearance around the door between the door flanges and side top and bottom flangesshall not be more than 1.25mm.

83.7 Hinges:

The hinges shall be either plain butt type made from CRCA not less than 1.6mm thick or double folded type fabricated from CRCA sheet not less than 1.25mm thick. The hinges shall be secured to the mild steel hinge bracket not less than 2.5mm thick on one side and shall be secured to the door on the other side of the fulcrum. The numberof hinges per door leaf shall not be less three.

83.8 Lock:

The locking and handle of the storage shall be oxidized brass Mazak handle with three way locking mechanism controlled by lock operated by handle with min 03 duplicate keys of Godrej/ Vijayan or of approved make.

83.9 Shelves:

The shelf panel (minimum four nos.) shall be height adjustable and should be made of 0.7mm thick CRCA steel confirming to IS: 513 -2008 grade to take the maximum load bearing capacity of 75 Kg uniformly distributed per shelf. Shelves shall have lipped flanges 25mm in width and 15mm in depth. Each shelf shall be supported on four shelf bracket. The bracket shall be made of CRCA not less than 1.6mm thick. Thebracket shall be so designed and constructed that the shelf is securely supported and that adjustment inside the bracket can be effected easily. Four rack strips with machine punched slots shall be provided for supporting the shelves covering the full height of the cabinet. Rack strips shall be made of CRCA not less than 1.00 mm thick.

83.10 Pedestal:

Two pedestals spanning the depth of the cabinet shall be made from CRCA sheet notless than 1.00mm thick and shall be properly stiffened. The pedestal shall not projectout of the cabinet and shall be 125 ± 5mm in height.

83.11 Finish:

83.11.1 Epoxy Polyester Powder in fire retardant paint coated to the thickness of minimum 40 – 60 microns (+/-10).

83.11.2 Process:

The body including shelves, framework for door including hinges involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of minimum 40 –60 microns (+/-10). The material is then oven baked with a controlled temperature of 180 deg.C to 200 deg.C.

83.11.3 Tests:

The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity, Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding, detergents, acid/ alkali. The test reports shall be submitted along with the tender.

83.12 Colour:

83.12.1 The colour shall be Prince Grey / Snowbell Grey.

83.12.2 Final colour scheme will be approved by DVET at the time of placement oforder. Manufacturer to furnish various colour schemes available with them.

83.13 Manufacturing Process:

83.13.1 The complete unit shall be as per manufacturer's specifications and Flowchart of manufacturing process shall be submitted along with the tender.

83.13.2 Raw materials (Wood working): 1) Plain Particle Board (PPB), 2) Medium Density Fibre Board (MDF), 3) Pre-laminate Board (PLB), 4) Decorative Laminate (DL), 5) Fabric and 6) Lipping (PVC lipping).

Process (Wood working): MDF board from approved supplier -> Wood Cutting (cutting from mother board 600mm x 2400mm sheet to the desired size on Panel saw machine with no sharp edges, no glue marks, no scratches, no machine marks and no cracks at drill hole) -> Lamination (Hot lamination adhering Decorative laminate to MDF board using approved make adhesive) -> Sizing/ Routing (fine sizing and setting curvilinear shapes) -> Lipping/ Edge banding (adhering PVC lipping on MDF board using hot melt glue under heat and pressure) -> Finishing -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).

83.13.3 Raw materials (Metal working): 1) Stainless Steel (Nickel and Chromium added to prevent steel from rusting), 2) Mild steel and 3) Epoxy polyester powder (for powder coating).

Process (Metal working): CRCA sheet from approved supplier -> Notching (cutting at the edge and punching holes, shearing, turret punching/ press operation, deburring of punched sheet) -> Metal forming (blending for the purpose of different applications, sheet bending) -> Assembly/ Sub-Assembly (for welded all components get assembled and for knock down sub-assembly takes place. CO_2 welding and spot welding is done) -> Pre-treatment (8 step process including anti-rust surface treatment) -> Powder coating (surface coating applied in the form of powder and on curing produces a protective coating, examination of test coating specimen for blisters, flaking and corrosion) -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).

83.13.4 Raw materials (Metal working): 1) Aluminium Extrusion.

Process (Metal working): Aluminium Extrusion from approved supplier -> Cutting of Aluminium extrusions to desired size -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).

83.13.5 For Steel Cupboard only Welded construction is acceptable.

83.13.6 The manufacturing processes given are generalized. Need to consider wherever it is applicable as per the Specifications of the product.

83.13.7 All raw materials for manufacturing process shall be as per relevant IS code.

83.14 Size and Weight:

83.14.1 Overall Length: 915 mm

83.14.2 Overall Width: 485 mm

83.14.3 Overall Height: 1980 mm

83.14.4 Net Weight: Minimum 70 to 80 Kg

84. Interactive Smartboard with Projector

- 86” Interactive Intelligent Panel with OPS
- Toughened glass protection (Mohs level 7), complete aluminum alloy body.
- Inbuilt Audio System: 20X2 Output, 20W Sub woofers
- 40 Point multi touch In build computer with i7 processor 11th gen, 8GB Ram, 256 GB SSD and 1TB Hard disk space.
- Wi Fi, LAN and Bluetooth capabilities.
- Windows 10 professional Operating System license is included
- Board 2.0, White board Software preloaded with lifelong support and upgrades.
- Connect: App to connect 4 laptops simultaneously
- Antivirus, valid for one year
- 86”-Android version 13, 8GB RAM / 128 GB Flash Drive
- Remote, HDMI Cables, AV Cables and USB cable set.
- NFC Authentication & Smart remote
- Set of 2 soft pens.

85. Fire Extinguisher

85.1 Basic Indicative Diagram	
85.2 Capacity (In Kg)	02Kg
85.3 IS Specification	2171
85.4 Jet Range (In Mtrs.)	4-5
85.5 Discharge Time (In secs.)	15-20
85.6 Min. Discharge Quantity	90%
85.7 Seal of Approval	ISI