

11. RESOURCE REQUIREMENTS FOR AUTOMOBILE ENGINEERING

11.1 Physical Resources

11.1.1 Space Requirement:

Norms and standards laid down by All India Council for Technical Education (AICTE) may be followed to work out space requirement in respect of class rooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

11.1.2 Equipment Requirement: (Cost is very much tentative. Latest cost may be checked from the market)

1. Name of Laboratory: Construction Materials Testing
 - A) Concrete
 - B) Roads and Soils

I. Auto Work Shop I, II

Sr. No.	Description	Qty
1.	Automobile standard Hand tool kit	2 No.
2.	Pneumatic Wrench	2 No.
3.	Air Compressor (Air Compressor two Stage , twin cylinder Air cooled, Reciprocating Type, Oil Splashing Lubrication System, Driven by 5H.P.-3Phase Motor Starter with a working pressure gauge, automatic pressure gauge, safety Valve, Non Return Valve etc.	1 No.
4.	Special Tools, Measuring Tools And Gauges Kit	
i.	Torque Wrench (0 to 10 kgm)	2 No.
ii.	Piston Ring Expander 50 to 125mm	2 No.
iii.	Piston Ring Compressor (Double Band) 50 to125mm	2 No.
iv.	Valve Lifter (C type and Screw type)	2 No.
v.	Deep Socket Set (6mm to 32mm)	1 No.
vi.	Piston Groove Cleaner with Cutter	2 No.
vii.	Piston Ring Files	2 No.
viii.	Brake Shoe Spring Plier	2 No.
ix.	Adjustable Wrench (6mm to 32mm)	2 No.
x.	Cylinder Dial Gauge Measuring upto0.001inches	2 No.
xi.	Pinion Depth Gauge	2 No.
xii.	Outside Micrometer (Mech. & Digital) 50mm to75mm & 75mm to 105mm	2 No.
xiii.	Inside Micrometer (Mech. & Digital) 50mm to75mm & 75mm to 100mm	2 No.
xiv.	Vernier Caliper (Mech. & Digital) 0 to 300mm	2 No.
xv.	Depth Gauge 0 to 300mm	2 No.
xvi.	Feeler Gauge 0.001mm to 1mm	3No.
xvii.	Steel Foot rule 0 to 300mm	2 No.

Xviii	Backlash Measuring Gauge (Jeep/Truck)	1 No.
5.	Single Plate Cluch (Jeep/Car)	1 No.
6.	Multi Plate Cluch (Scooter & Motorcycle)	1 No.
7.	MPFI Demonstration Model with all Sensors.	1 No
8.	Synchro Mesh Gear Box (Car & Bus)	1 No.
9.	4 wheel alignment system with all accessories Power supply 50/60 Hz, 350 Watt single-phase motor. Dimensions: 78 cm, Depth 74 cm, Weight 231 kgs	1 No.
10.	Body Fender Kit (Denting Tool Kit)	2 No.
11.	Differential Bearing Puller	1 No.
12.	Paint Spray Gun	2 No.
13.	Microprocessor wheel balancing machine with all accessories 1. Monophase power supply, 220 Volts, 0.11 KW 2. Balancing accuracy + 1 g 3. Rim diameter from 10" to 24" 4. Rim width from 1.5" to 20" 5. Maximum wheel weight 65 kgs.	1 No.
14.	Brake Shoe riveting and De-riveting Machine	1 No.
15.	Hydraulic Jack 2 Ton capacity	2 No.
16.	Mechanical Screw Jack 2 Ton capacity	2 No.
17.	Mechanic Creeper	5 No.
18.	Vehicle Prop	6 No.
19.	Gypsy (Diesel) old in good condition	1 No.
20.	Working Model of Complete Chassis (Jeep/Truck)	1 No.
21.	Bolero Jeep (New) for demonstration	1No.
22.	Bench Grinder	1 No.
23.	Bench Drilling Machine	1 No.
24.	Portable Electric Arc Welding Set	1No.
25.	Hand Drilling Machine	1No.
26.	Tool Trolly	2 Nos
27.	Bench Vice 4 inches	2 No.
28.	Sledge Hammer 10lbs (2.5Kg)	2 No.
29.	Wire Stripper	2No.
30.	Hub Puller	2 No.
31.	Wheel Spanner Cross Type	2No.
32.	Wheel Spanner L-Type	2No.
33.	Valve Die	4No.
34.	Pneumatic Socket Set	2 Sets.
35.	Electric Wrench Portable Drilling Machine ½"	1 No.
36.	Tyre Lever	2 Sets
37.	Car washing Machine Operating Pressure 20LiterPer inch square with 3H.P. Motor With All Accessories	1No.
38.	Hydraulic Hoist 4 Ton Capacity, single Post with a Stroke of 1500mm – 4 to 5meter Length of ramp with oil Tank with oil Control valve	1No.
39.	Service Pit for Light and heavy Vehicle(Inside & outside)	3Nos
40.	A.C. Fuel Pump	2No.

41.	Scooter/ Motorcycle/ Three Wheeler	1Each
42.	Chassis of Mini Bus	1No.
43.	Tyre Inflation with Twin Hose Assembly and Small Hose Assembly (Wall Model)	1No.
44.	Tyre Pressure Gauge	3No.
45.	Hot Patching Machine	2No.
46.	Automatic/Semi Automatic Tyre changer for All vehicle- Wheel Discs Upto 17 inches Suitable for all cars and L.C.V.	1No.
47.	Soldering Iron and Soldering Kit	2No.
48.	High Pressure Grease Pump with a working ratio 50:1 Built In Air Regulator, Trigger Operated Control valve and all necessary Accessories	1No.
49.	Hand Grease Gun, 1/2Kg Capacity	1No.
50.	Hand Grease Pump ,5Kg capacity with all Accessories	2No.
51.	Oil Gun 1/2 Liter Capacity	2No.
52.	Carburetors of cars, Scooter, Motorcycles and Jeep	2No.
53.	Diesel Engine Fuel Injector of different Types (Single Hole, Multi Hole, Pintex , Pintel Type)	6No.
54.	Oil Pump (Gear Type and Rotor Type)	1Each
55.	Distributor (Prestolite and Lucas Tvs)	1Each
56.	Distributor Magnetic Pulse Type	1 No.
57.	Compression Gauge for (Petrol)Engine with rubber Adopter	2 No.
58.	Compression Gauge for Diesel engine with standard Adopters	1 No.
59.	Vacuum and Fuel Pump Tester for Petrol Engine	1 No.
60.	Hydrometer	3No.
61.	Dwell Techometer (Dwell Tester) 6 V & 12 Volt Battery	2No.
62.	Timing Light with Advance System and Three Leads	2No.
63.	Spark Plug Cleaning and Testing Machine	1No.
64.	Battery Capacity Tester	2No.
65.	Radiator Leakage Tester (Pressure Tester)	1No.
66.	Petrol Engine (4 Cylinder) with All Accessories	1No.
67.	Diesel Engine (Multi cylinder) with All Accessories	1No.
68.	Engine Scanner for LMV	1No.
69.	S. U. Electric Fuel Pump	2No.
70.	4 Cylinder Fuel Injection Pump (Plunger Type)	1No.
71.	Distributor Type Fuel Injection Pump	1No.
72.	Old Petrol Engine Vehicle	1No.
73.	Old Petrol Engine with All Accessories	1 No.
74.	Engine Analyzer professional work station with all accessories and built in exhaust gas analyzer 1. Switching 115/230 VAC + 10% 2. Overall dimensions 61" Height x 39" width 3. Boom height approximately 80" 4. Boom length approximately 54"	1No.
75.	Vacuum and Fuel Pump Tester	2No.
76.	Compressed Air Supply according to lab. Dimensions	Complete

II. Auto Reconditioning Lab

Sr. No.	Description	Qty
1.	Auto standard Hand Tool Kit	2No.
2.	Engine De-carbonising Tool Kit	2No.
3.	Multi Cylinder Diesel Engine	2No.
4.	Valve Seat Cutter Set	2Set
5.	Valve Seat Grinder Set	2Set
6.	Valve Lappers (Set of 12 Pieces)	2Sets
7.	Valve Spring Tester	1No.
8.	Valve Refacing Machine	1No.
9.	Fuel Injector Tester with Calibrating Gauge 0.400 KG/Cm	1No.
10.	Fuel Injection Pump Calibration Machine (F.I. Pump Test Bench) Diesel	1No.
11.	Cylinder Head Refacing Machine	1No.
12.	Ridge Cutter	2No.
13.	Cylinder Boring Machine- Vertical Capacity 40x200mm Max, Max. Boaring depth 610mm	1No.
14.	Cylinder Dial Gauge	2No.
15.	Inside Micrometer Different Range (0-50,50-75,75-100mm)	3No.
16.	Digital Micrometer Different Range	3No.
17.	Telescopic Gauge	3No.
18.	Cylinder Honning Machine(Vertical Beam Type)	1No.
19.	Crank Shaft Grinding Machine	1No.
20.	Connecting rod aligner to check a maximum bore of Big end 80 mm and Minimum 40 mm with suitable accessories	1 No.
21.	Line Boring Machine	1No.
22.	Sleeving And De- sleeving Tool (Screw Type)	1No.
23.	Hydraulic Press 5 Ton Capacity	1No.
24.	Nozzle Lapping and Grinding Machine	1No.
25.	Nipple Forming Tool	2No.
26.	Brake Drum Skimming Lathe	1 No.
27.	Torque Wrench	2No.
28.	Chain Pulley Block	1No.
29.	Hydraulic Floor Crane 2 Ton Capacity	1No.
30.	Drilling Machine 0.5 HP, 1- Phase- ½" spindle	1No.
31.	Grinding Machine (Bench Type) 0.5 HP 1-Phase	1No.
32.	Bench Vice 4 Inches	2No.
33.	Tool Trolley	2No.
34.	Piston Ring Compressor , 60mm to 120mm Double Band	2No.
35.	Piston Ring Expander , 60mm to 120mm	2No.
36.	Piston Groove Cleaner with Cutter	2No.
37.	Piston Ring Files	2No.
38.	Valve Lifter (C- Type)	2No.
39.	Valve Lifter (Screw Type)	2No.
40.	Deep Socket Set	1Set

41.	Vernier Calliper (Mech)	2No.
42.	Vernier Calliper (Digital)	2No.
43.	Outside Micrometer Different Range	3No.
44.	Adjustable Wrench 6mm to 32 mm	2No.
45.	Pipe Wrench	2No.
46.	Nose Pliers (Straight)	2No.
47.	Bent Nose Plier	2No.
48.	Combination Pliers	2No.
49.	Wire Stripper	2No.
50.	Heavy Duty Box Spanner Set Complete	1Set.
51.	Pneumatic Socket Set	2Sets
52.	Pneumatic wrench 1/2 Inch size	1No.
53.	Compressed Air Supply according to lab. Dimensions	Complete

III. Auto Standard Hand Tool Kit

Sr. No.	Description	Qty
1.	Double Open ended Spanners 6mm to 32 mm	12No
2.	Open ended Spanners 6mm to 32 mm	12No
3.	Ring Spanners 6mm to 32 mm	12No
4.	Socket Set with Reversible Ratchet with Extension Rod and T-Handle	1Set
5.	Adjustable Spanner 250mm Long	2No.
6.	Pipe Wrench 300 mm Size	2No.
7.	Screw Driver Plastic Handle 150 mm Long Different Tip Sizes	2No.
8.	Screw Driver Plastic Handle 100 mm Long	1No.
9.	Screw Driver Plastic Handle 200 mm Long	1No.
10.	Screw Driver Phillips Type, Plastic Handle 3 mm Lip , 100 mm Long	1No.
11.	Screw Driver Phillips Type, Plastic Handle 6 mm Lip , 150 mm Long	1No.
12.	Insulated Electrician Screw Driver 150 mm Long	1No.
13.	Combination Plier Insulated 150 mm Long	1No.
14.	Long Nose Plier Insulated 150 mm Long	1No.
15.	Allen Key Set 1.5 mm to 12.4 mm sizes	1Set
16.	Round File , Fine, Double Cut 150 mm Long	1No.
17.	Steel Rule 300 mm Long	1No.
18.	Wire Brush	1No.
19.	Scraper , Flat Blade , 150 mm Long	1No.
20.	Scraper , Triangular Blade	1No.
21.	Twist Drill Set (3 mm to 15 mm)	1set
22.	Steel Measuring Tape 2 Meters Gratuated in mm	1No.
23.	Feeler Gauge 0.05 mm to 1.5 mm	1No.
24.	Ball Pein Hammer (Wooden Handle), 0.5 Kg Weight	1No.
25.	Ball Pein Hammer (Wooden Handle), 250 Gram Weight	1No.
26.	Plastic Hammer, 300 Grams Weight	1No.

27.	Wooden hammer (Mallet)	1No.
28.	Plug Spanner	1No.
29.	Hacksaw , Metal Frame , Adjustable type upto 300 mm	1No.
30.	Flat File Double Cut Rough 200 mm Long	1No.
31.	Flat File , Smooth , Double Cut 150 mm Long	1No.
32.	Half Round File , Medium , Double Cut 150 mm Long	1No.
33.	Square File , Smooth , Double Cut 150 mm Long	1No.
34.	Bearing Puller	1No.
35.	Tap and Die Set 3 mm to 16mm	1Set Each

IV. Auto Cad Lab

Sr. No.	Description	Qty
1.	Computer System Latest Configuration	25No.
2.	CAD Software -08 Pro Engineer/Catia/Auto CAD 2007 or latest	25 Users
3.	Local Area Network	Complete
4.	Printer Along with Drafter	2No.
5.	Laser Jet Printer/Business Ink Jet-1000	2No.
6.	Electrician Hand Tool Kit	1No.

V. Driving Practice Lab

Sr. No.	Description	Qty
1.	Dual Control Vehicle (Diesel)	1No.
2.	Traffic Road Sign Board	1No.
3.	Auto Standard Hand Tool Kit	1No.
4.	Road Marking Board	1No.
5.	Brake Efficiency Tester	1No.
6.	Hydraulic Jack 2 Ton Capacity	2No.
7.	Screw Jack 2 Ton Capacity	2No.
8.	Wire Stripper	2No.
9.	Driving Simulation Equipment(Complete with all controls)	2 Systems

VI. Auto Electrical Lab

Sr. No.	Description	Qty
1.	Lead Acid Battery -12V (55 to 70 AH rating)	2No.
2.	Hydrometer	3No.
3.	Battery Capacity Tester	2No.
4.	Battery Charger Heavy Duty (6-36 Volts, 0-10 Amp)	2No.
5.	Dwell Techometer	2No.
6.	Ignition Timing Light with Advance Mechanism (12V Battery)	2No.
7.	Spark Plug Cleaning & Testing Machine With Compressed Air Supply Line	1No.
8.	Growler and Armature Testing Attachments with Prode	2No.
9.	Test Lamp	2No.

10.	Alternator Regulator Tester for testing electronic Regulator (Automobile Range)	2No.
11.	Head Light Beam Aligner for Light/ Heavy Vehicle	1No.
12.	Horn with Relay Different Types	3No.
13.	Starter- Over running clutch & Preengaged	2No.
14.	Auto Electric Wiring Board Complete with all Auto Electric Points/equipments	1No.
15.	Electronics Ignition System Board Complete	1No.
16.	Magneto Ignition System Board	1No.
17.	Auto Electrician Tool Klt	2No.
18.	Ammeter	2No.
19.	Voltmeter	2No.
20.	Multimeter	2No.
21.	Wire gauge	2No.
22.	Feeler Gauge	2No.
23.	Tool Trolley	1No.
24.	Bench Vice 4 Inches	2No.
25.	Wire Stripper	2No.
26.	Combination Pliers	3No.
27.	Hand Tools Kit	1 Kit
28.	Dynamo/Alternator/Regulator test bench for automobile range	1Each
29.	Cadmium stick tester (Battery tester)	1No
30.	Compressed Air Supply according to lab. Dimensions	Complete

VII. Applied Mechanics

Sr. No.	Description	Qty
1.	Parallelogram Apparatus	2No.
2.	Triangle Apparatus	2No.
3.	Polygon Apparatus	2No.
4.	Jibs And Crank Apparatus	2No.
5.	Simply Supported Beam Apparatus	2No.
6.	Inclined Plane Apparatus	2No.
7.	Screw jack Apparatus	2No.
8.	Worm And worm Wheel Apparatus	2No.
9.	Single purchase Crab Apparatus	2No.
10.	First System of Pully Apparatus	2No.
11.	Second System of Pully Apparatus	2No.
12.	C.G. Apparatus	2No.
13.	Friction Apparatus (Three Pairs)	2No.
14.	Double Open Ended Spanner Set 6mm to 32mm	1 Set
15.	Ring Spanner Set 6mm to 32mm	1 Set
16.	Adjustable wrench	1No.

VIII. Thermal Engineering Lab/I.C. Engine Lab.

SN.	Description	Qty
1.	Fire Point and Flash Point Apparatus(Ables Apparatus)	2 No. Each
2.	Visco Meter	2No.
3.	Air Compressor Single Stage, Double Cylinder, Reciprocating Type, 5 H.P. 3Phase Motor Starter	1 No.
4.	Electronic Exhaust Gas Analyzer (Petrol) with Computer and Cemra	1No.
5.	Electronic Exhaust Gas Analyzer (Diesel) with Computer and Cemra	1No.
6.	4-Cylinder Petrol Engine Test Rig(Morse Test)	1 No.
7.	Multi Cylinder Diesel Engine Test Rig to Draw Heat Balance Sheet	1No.
8.	Automobile Air Conditioner (Light/ Heavy Vehicle) 2Ton Split Type	1No.
9.	Tool Trolley	1No.
10.	Bench Vice 4 Inches	2No.

IX. S.O.M. And Hydraulics Lab

Sr. No.	Description	Qty
SOM Lab.		
1.	Universal Testing Machine(Microprocessor Based)	1No.
2.	Impact Testing Machine(Izod & Charpy)	1No.
3.	Hellical Spring Testing Apparatus	1No.
4.	Bending Test Apparatus With Tools And hangers	1No.
5.	Torsion Testing Apparatus(Fully Computerized)	1No.
6.	Rockwell Hardness Testing Machine	1No.
7.	Vickers Hardness Testing Machine	1No.
8.	Visco Hardness Testing Machine	1No.
9.	Double Open Ended Spanner Set (6mm to 32mm)	1 Set
10.	Ring Spanner Set (6mm to 32mm)	1 Set
Hydraulics Lab		
1.	U-Tube Manometer	5No.
2.	Inclined Tube Manometer	5No.
3.	Piezo Meter Tube	5No.
4.	Bourden Type Pressure Gauge	2No.
5.	Reciprocating Pump (Single Acting) Horizontal Type, Single Cylinder With All Accessories	1No.
6.	Centrifugal Pump With all Attachments for Testing Performance Characteristics of Centrifugal Pump	1No.
7.	Hydraulic Test Bench Includes Venturimeter, Orifice meter, V-Notch Test, Friction Through Pipes	1No.
8.	Bernoulie's Theorem Apparatus	1No.
9.	Open Ended Spanner Set 6mm to 32mm	1Sets
10.	Double Open Ended Spanner Set 6mm to 32mm	1Sets
11.	Bench Vice 4 inches	2No.

12.	Combination Plier	2No.
13.	Pipe Wrench 10Inches ,12 Inches	2No.
14.	Hydraulic Bench	7No.

X. Electrical Technology Lab

Sr. No.	Description	Qty
1.	Regulated Power Supply 0-35V, 1Amp, Resistance, 0-500Ohm	2No.
2.	Rheostats Different Range	4No.
3.	Source of AC Supply)-230V	1No.
4.	Voltmeter 0-300V	3No.
5.	Ammeter – 0.5Amp	3No.
6.	Resistance Load 0-1KW	3No.
7.	Wattmeter 0-1500W 5/1 Rating	3No.
8.	Single Phase Power Factor Meter	1No.
9.	Transformer 1KVA	1No.
10.	3Phase Squiral Case induction Motor 0-3H.P. with Terminal Brought Out	2No.
11.	Star/Delta Starter	2No.
12.	D.O.L. Starter	2No.
13.	Single Phase Induction Motor 0.25H.P.	2No.
14.	D.C. Shunt Motor-Generator Set 0-5H.P. coupled with a Source of D.C. Supply . Load-3KW, D.C. Ammeter and D.C. Voltmeter	1No.
15.	C.R.O. Frequency Generator	1No.
16.	Digital Multimeter 3and1/2 Digits	2No.
17.	Electric Hand Tool kit	1No.
18.	Bench Vice 4 Inches	2No.
19.	Pliers (Insulated)	3No.
20.	Wire Stripper	2No.

11.1.2 Space Requirement:

Norms and standards laid down by All India Council for Technical Education (AICTE) may be followed to work out space requirement in respect of class rooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

11.1.3 Furniture Requirement

Norms and standards laid down by AICTE be followed for working out furniture requirement for this course.

11.2 Human Resources:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE