

## 11. RESOURCE REQUIREMENT FOR MECHANICAL ENGINEERING DEPARTMENT

### 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:

Sr.No.	Description	Qty
<b>MATERIAL SCIENCE LABORATORY</b>		
1	Salt bath oil fired furnace (Digital Control)	1
2	Salt bath Electric resistance furnace (Digital Control)	1
3	Electric furnace muffle type(Digital Control)	1
4	Forced circulation tempering furnace (Digital Control)	1
5	Quenching Tank	1
6	Work Benches	2
7	Pyrometers/Thermocouples	2
8	Pot for bailing out the salt	1
9	Metallurgical Microscope (attached with monitor)	1
10	Abrasive cut off machine	1
11	Grinding and polishing machine	1
12	Grinder	1
13	Fire tongs	3
14	Hand gloves and other safety equipments	1set
15	Brinell Hardness testing Machine	1
16	Rockwell Hardness testing Machine	1
17	Forced circulation tempering machine	1
18	Mounting Press	1
19	Samples of different metal ,Nonmetals,alloys,ferrous & nonferrous	3each

#### Applied Mechanics Laboratory

1	Polygon law of forces apparatus	5
2	Parallelogram law of forces Apparatus	5
3	Triangle law of forces Apparatus	5
4	Apparatus for reaction at supports	4
5	Jib Crane	2

6	Screw Jack	4
7	Inclined Plane & friction Apparatus with different surfaces	5
8	Worm and worm wheel	4
9	Single Purchase Winch Crab	2
10	Pulleys first System & second System	2 each
11	Rope Brake Dynamometer	2
12	Weights of different magnitude upto 20Kg	4set
13	Weight boxes	5set
14	Spring Balances upto 20 kg capacity	5pcs
15	Vernier calliper (Digital Type)	2
16	Micrometer( 0-50mm) (DigitalType)	2
17	Out side calliper	4
18	Inside calliper	4
19	Tool Kit	1set

#### **STRENGTH OF MATERIALS LABORATORY**

1	Brinell Hardness Tester	1
2	Rockwell Hardness Tester	1
3	ImpactTestingMchine with Izod & Charpy attachment	1
4	Microprocessor based universal testing machine	1
5	Torsion Testing Machine (computerised)	1
6	Hellical Springs	4

#### **ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY**

1	Wattmeter	5
2	ammeter	5
3	Volt meter	5
4	DC Shunt Motor	1
5	Single Phase variac	1
6	Single Phase Transformer	1
7	Resistive Load	1
8	Multimeter	1
9	CRO	1
10	Regulated Supply	1
11	Singnal Generator	1
12	Three Phase Induction Motor	1
13	Three Phase Variac	1
14	DC Shunt Generator Coupled with motor and starter	1
15	Rheostat	2
16	Tachometer	1

## HYDRAULICS AND PNEUMATIC LABORATORY

1	Piezometer tube	2
2	U tube Differential Manometer	2
3	Inclined Manometer	1
4	Bourden PressureGauge	1
5	HydraulicJack	1
6	Hydraulic Press	1
7	Bernoulli's Apparatus	1
8	Venturimeter Apparatus with differentialManometer	1
9	Pipe Friction Apparatus	1
10	Reciprocating Pump	1
11	Centrifugal Pump coupled with PeltonWheel	1
12	Centrifugal Pump coupled with Francis Turbine	1
13	Model of PeltonWheel	1
14	Model of Feancis Turbine	1
15	Reynold' Apparatus	1
16	Orifice Meter	1
17	Notches Apparatus wuth differentNotches	1
18	Cut SectionModel of Centrifugal Pump	4
19	Hydraulic brake with cut section model and line circuit	1
20	Tachometer	1

## THERMODYNAMICS LABORATORY

1	Throttling Calometer	1
2	Bomb Calometer	1
3	Junker's Gas Calometer	1
4	Gravimetric Analysis	1
5	Orsat Apparatus	1
6	Mechanical Types Co <sub>2</sub> Recorder	1
7	Single Stage Reciprocating Pump	1
8	RotaryCompressor	1
9	Flash Point Apparatus	1
10	Pyrometer	2
11	Lancashire BoilerModel	1
12	Model of Impulse Turbine	1
13	Model of ReactionTurbine	1
14	Model of Surface Condenser	1
15	Spring Loaded safe type valve	1
16	Single cylinder 2 stroke petrol Engine	1
17	Single cylinder 4 stroke petrol Engine	1
18	Multicylinder Petrol EngineTest Ring	1

**METROLOGY AND INSTRUMENTATION LABORATORY**

1	Digital Vernier Calliper	3
2	Digital Micrometer	3
3	Vernier Calliper with least count 0.02mm	2
4	Micrometer with least count 0.01mm	2
5	Vernier Height Gauge (450mm)	2
6	Vernier Depth Gauge	2
7	Combination Set	1
8	Bevel Protractor	1
9	Sine Bar	1
10	Precision Balls and Rollers	1
11	Surface Plate	2
12	Slip Gauges Set	1
13	Comparator-Mechanical ,Pneumatic	2
14	Gear Tooth Vernier	1
15	Snap and Ring Gauges	1
16	Feeler Gauges and Radius gauges	1
17	Angle Plate	1
18	Tool Makers Microscope	1
19	Profile Projector with accessories	1
20	Surface Roughness Tester with accessories	1
21	Work Benches	2

**REFRIGERATION AND AIR CONDITIONING LABORATORY**

1	Refrigeration Trainer	1
2	Air Conditioner Trainer	1
3	Water Cooler	1
4	Experimental Ice Plant	1
5	Refrigeration Compressor	1
6	Safety Control (HP,LP Cut out ,Oil Pressure Control),Solenoid	1set
7	Valve,Expansion Valve ,Thermostat , Charging Board	
8	Gas Charging Equipment	1
9	Vacuum Pump	1
10	Tube Cutter( $\phi$ up to 2cm)	1
11	Flaring Bar and Flaring block	2 each
12	Swaging Tool ( $\phi$ 5mm,6,8,10mm)	2 each
13	Bending Tool ( $\phi$ 5mm,6,8,10mm)	2 each
14	Copper Tubes( $\phi$ 5mm,6,8,10mm)	10 meter each
15	Hilode Torch	1
16	Micrometer(0-25mm)	1
17	Vernier Calliper with least count 0.02mm	1
18	Tool Kit	1 set

**AUTOMOBILE ENGINEERING LABORATORY**

1	Model of Head Light (LMV)	1
2	Model Wiper and Indicator	1set each
3	Cut Sectin Model of AC Pump &S.U Pump.	1each
4	Master Cylinder	1
5	Rear axle	1
6	Cut Section Model of Differential	1
7	Model of Steering System Mechanism	1
8	Diesel Engine	1
9	Four Wheeler forDriving Practice (LMV)	1
10	Battery Charger unit	1
11	Hygrometer	1
12	Cell Tester	1
13	Engine with MPFI System	1
14	Wheel alingment machine	1
15	Compressor	1
16	Spark Plug Tester and filler gauge	1set each
17	Carburreter Kit	1
18	Lapper	1
19	Hydraulic Jack	1

**COMPUTER LABORATORY**

1	Pro-E/Catia/NX5/Solid Works/Ideas	At least two
2	Auto CAD	1
3	Computer Pentium (Latest)	25
4	Plotter	1
5	Scanner	1
6	Printer(Laser )	2
7	UPS	25
8	LCD Projector	1

**C.N.C. FOR 6TH SEM. MECH.ENGG.**

1.	CNC LATHE TRAINER MODEL	2
2.	CNC MILLING TRAINER MODEL	1
3.	COMPUTERS COMPATIBLE WITH CNC P 4	10
4.	LASER PRINTER	2
5.	HSS TOOLS6*6*50MM	10
6.	END MILL CUTTER	
	DIA 16MM	2
	DIA 12MM	2
	DIA 10MM	2
	DIA 8MM	2

	DIA 6MM	2
	DIA 5MM	2
	DIA 3MM	2
7.	COLLET CHUCKS –	
	DIA 16MM	1
	DIA 12MM	1
	DIA 10 MM	1
	DIA 8MM	1
	DIA 6MM	1
	DIA 5MM	1
	DIA 3MM	1
8.	VERNIER CALLIPER300MM	2
9.	STEEL FOOT RULE	2
10.	BALL PEAN HAMMER 250 GM.	1
11.	BALL PEAN HAMMER 500GM.	1
12.	BALL PEAN HAMMER 1KG	1
13.	SPANNER SET OPEN END	1 SET
14.	RING SPANNER SET	1 SET
15.	ALLEN KEY SET	1 SET
16.	OIL CANE	2
17.	FLAT FILES	
	12”	2
	10”	2
	8”	2
	6”	2
18.	OUTSIDE CALLIPER 100MM	1
19.	INSIDE CALLIPER 100MM	1
20.	TOOL HOLDER FOR 6MM	2

**FITTING SHOP FOR 3RD SEM MECH. ENGG.-**

1.	POWER HACK SAW 200MM	1
2.	PILLER VTYPE DRILLING MACHINE 25MM.	1
3.	DRILLS 3,5,6,8,9,10,12,14,16,20,24	2NO EACH
4.	TAP HANDLE SMALL & BIG	2 EACH
5.	TAP SET 3,5,6,8,12,14,16,20,24	2EACH
6.	REAMER5,6,8,12,14,20,24	1EACH
7.	COPUNTER SUNK DRILL 10,12,14,20	1EACH
8.	DIE SET WITH HANDLE 1TO 25MM	1 SET

## FOUNDRY SHOP

1	Showel	4
2	Riddle-hand made	4
3	rammer	4
4	Strike off bar	5
5	Vent wire	5
6	Sprue pin	5
7	Lifter	10-May
8	Trowel	5
9	Slicks	5
10	Swab	2
11	Mallet	4
12	Gate cutter	5
13	bellow	4
14	Rapping plate	3
15	Moulding board	3
16	Spirit level	1
17	Clamps 4", 6", 8"	3 NO EACH
18	Moulding boxes	24
19	Ladles	10,20,30,40 KG
20	Crucible 10,20,40,60,70 NO. SIZE	1 NO EACH
21	Lifting tongs	2
22	Crow bars	3
23	Kassi	3
24	Gloves	2 pair
25	Apron	6 pairs
26	Bucket (steel)	4

### SANDS IN FOUNDRY:

1. green sand: compositional(100 cubic feet)
  - a) floor sand- light works 6parts 8%, general works 8parts, smooth finish 10 parts 57.1%
  - b) new dust-light work 1part 13.4%, general work 4parts 29.6%, smooth finish 4 parts 22.9 %
  - c) coal sand-1/2 part 6.1% for light work, 1.5 part 11.1% for general work and 1.5 part 8.6% for smooth finish.

### 3RD SEMESTER MECHANICAL

#### Machine Workshop-:

SNO	Tools & Equipment	Qt
1	Shaper Machine 600mm	6
2	Slotter Machine 600mm	1
3	Planner Machine 1800mm	1
4	Pillar Drilling Machine 25mm	1
5	Surface Plate 3'*3'	1
6	Cutting Tool Holders 10"	10
7	H.S.S. Tool Bits 10x10x100mm	20
8	H.S.S. Tool 12x12x150mm	10
9	Try Square 150mm	10
10	Spanner Set Open End	2
11	Spanner Set Ring Type	2
12	Steel Foot Rule 300mm	6
13	Ball Pein Hammer 1KG	6
14	Ball Pein Hammer 250GM	6
15	Centre Punch 150mm	6
16	Vernier Height Gauge 300mm	1
17	Vernier Calliper 300mm	1
18	Oil Cane	6
19	Machine Vice 150mm	6
20	Allen Key Set	1
21	File 12"	2
22	File 10"	2
23	File 8"	2
24	File 6"	2
25	Twist Drills 13mm to 25mm	2
26	Twist Drills 2mm to 12mm	2
27	Outside Calliper 150mm	2
28	Inside Calliper 150mm	2
29	Screw Driver Set	1
30	Plier Combination	1
31	Cold Chisel 150mm	2

#### MACHINE SHOP 4<sup>TH</sup> SEM MECHANICAL ENGG.

1	Surface grinding machine with magnetic table 450mm	1
2	Pedestal grinding machine 300mm	1
3	Grinding wheel(150*12*25mm)	6
4	Grinding wheel (300*50*50mm)	2
5	Dimond dresser150mm	2



### **MACHINE SHOP FOR 5th SEMESTER MECH. ENGG.**

1.	Vertical milling machine table size 1200*300mm	1
2.	Horizontal milling machine table size 1200*300mm	1
3.	Plain milling cutter120*75*25mm	1
4.	Side end face cutter120*12*25mm	1
5.	Slitting saw cutter120*6*25mm	1
6.	Form cutter convex and concave 75*20*25mm	1 set
7.	Involute gear cutter2 module , 3 module	1 set each

### **PATTERN MAKING SHOP**

1	Steel Foot Rule 1' , 2'	10no each
2	Shrinkage scale 2' 0.5%,0.8%,.1%,1.5%,2%	2no each
3	Try saqer 4",6"	10no each
4	Bevel protector	2no
5	Combination set 300mm.	2no
6	Vernier caliper 300mm.	2no
7	Depth gauge 300mm.	2no
8	In side caliper 4",6",10"	4no each
9	Out side caliper 4",6",10"	4no each
10	Steel tape 3miter	4no
11	Devicer 4",6",10"	4no each
12	Serface plate 1*1miter with stand	1no
13	Hight gauge 450mm.	1no
14	Radius gauge in side up to 25mm.	2no
15	Radius gauge outside upto 25mm	2no.
16	Hacksaw frame with blade	4no.
17	Tap Handle 10"	2no.
18	Tap set upto 12mm	1 set each
19	Drill set upto 12 mm	2 set each

20	Pattern making Bench vice 6",10"	10 no. each
21	Working Bench 30",4",8"	4 no.
22	Doweling jig	2 no.
23	Core Box Plane	10 no.
24	Rabbet Plane	10 no.
25	Iron Jack Plane 8",12",6"	5 no. each
26	Trammels	2 no.
27	Double Bar marking Gauge	5 no.
28	Rip Saw,cross cut saw 12",16"	5 no. each
29	Fillet	2 set
30	Claw Hammer 250 Pound	5 no.
31	Cross Pean Hammer 250 Pound	5 no.
32	Nillon hammer	5 no.
33	Plier 8"	4 pc.
34	Pincer 10"	4pc.
35	Screw Driver	2 Set
36	Allen Key in mm	2 set
37	Ring Spanner	1 Set
38	D/o Spanner	1 Set
39	Adjustable Wrench 10",8",6"	1 no. each
40	Saw set Plier	2 no.
41	Firmer Chiesel 1/4",1/2",1"	10 no. each
42	Mortise Chiesel 1/2",1/4",5/4"	10 no. each
43	G Clamp 4',6",4'	2 no. each
44	Side Axe, Adze	1 no. each
45	Dovetail Chiesel 1/4",1/2",1"	5 no. each
46	Outside ground Chiesel 1/2",5/4"	5 no. each
47	Inside Ground chisel 1/2",5/4"	5 no. each
48	Files- flat,square,triangular,Half-Round,Mill File,needle File, rasp file 6,8,10,12	10 no. each
49	Hand drill Machine 1/2" Drill capacity with drill set in mm	2 no. each
50	Jig saw portable Electric	2 no. each
51	Saber Saw portable electric	2 no.
52	Planer 4" portable electric	4 no.
53	Pattern milling machine Vertical	2 no.
54	Bench Grinder M/C 10"/1" wheel	1 no.
55	Wood working lathe	2 no.

56	Centre lathe 6ft with gap bed	1 no.
57	Electric Airless Paint Spray Gun Portable	1 no.
58	Angle plate 1'1'1'1'	1no
59	V-block 6"*6"*6"	2no

S. NO	EQUIPMENT/ TOOL	QUANTITY
1.	Centre lathe 6 feet	10 no
2.	Centreless grinder	1 no
3.	Tool post grinder	2 no
4.	Grinder	1 no
5.	Knurling tool	4 no
6.	Boring bar 3/16"	4 no
7.	Boring bar 1/4"	4 no
8.	Boring bar 3/8"	4 no
9.	Boring tools 1/2 sq.	10 no
10.	HSS tool bits 1/2"	10 no
11.	HSS tool bits 3/8"	10 no
12.	HSS tool bits 1/4"	10 no
13.	Drill taper shank 5/8",3/4",7/8",1"	4 no each
14.	Drills 5/8",3/8",1/2"	4 no each
15.	Drill chuck 1/2"	1no
16.	Drill sleeve 1 set	2 no
17.	Spring type outside caliper	10 no
18.	Spring type in side calliper	10 no
19.	Vernier caliper 8" analogue	6no
20.	Micro meter 0to 25mm, 25 to 50 mm, 50to 75 mm	3no each
21.	Centre punch	6 no
22.	Hammer 1/2 kg,1kg	2 no
23.	File flat 8",10",12"	6 no each

24.	Depth gauge	1 no
25.	Screw pitch gauge inches	1 no
26.	Screw pitch gauge mm	1no
27.	Spanner set	1no
28.	Marking block	8n0
29.	Universal marking gauge	4 no
30.	Radius gauge	1
31.	Lathe dog carrier 15mm,20mm25mm,30mm	1no each
32.	Number punch 1/8"	1 set
33.	Hack saw frame	2 no
34.	Spring divider	1no
35.	Screw driver 8",10",12"	3no each
36.	Oil cane	2no
37.	Nose plier	2no
38.	Tap handle	1no
39.	Combination plier	1no
40.	Socket spanner	1 set
41.	Ring spanner	1 set
42.	Allen key 1/16" 3/8"	1 set each
43.	Allen key1.5mm to 10mm	1 set
44.	Socket spanner	1 set
45.	Power hack saw	1
46.	Steel rule	10

**WELDING WORKSHOP FOR 4<sup>TH</sup> & 5<sup>TH</sup> SEM. MECHANICAL ENGG.**

SNO	Tool/Equipment	Qt
1	Arc welding set (500 amp, oil or air cooled, 2 Phase)	1
2	Spot welding set (415 Volt, 250-450 Ampere)	1
3	Seam Welding set (415 volt, 300-400 Amp)	1
4	Tig Welding set (415V,25-150 amp)	1
5	Mig welding set (415V, 50-300amp) Running voltage=50V)	1
6	Brazer (415V, 50-150 amp)	1
7	Oxygen gas cylinder	1
8	Acetylene gas cylinder	1
9	Argon gas cylinder	1
10	CO2 gas cylinder	1
11	Argon Gas Regulator	1
12	Oxygen Gas Regulator	1
13	CO2 Gas Regulator	1
14	Argon Gas Regulator	1
15	Oxy-Acetylene Gas welding Hose	20 ml
16	Gas Welding Torch	1
17	Arc welding lead(600 amp)	10ml
18	Brazer holder with lead	1 set
19	Arc welding holder(600 amp)	2
20	Chipping hammer	3
21	Welding screen with dark & plain glass	4
22	Gas welding Goggle	4
23	Steel wire brush	4
24	Cylinder key	2
25	Gas lighter	4
26	Spanner set (8-32)	1
27	Vice heavy duty with 5" jaw	4
28	Hack saw	4
29	Flat file rough 14"	5
30	Gas welding cutter	1
31	Working bench (3'*6')	1
32	Welding table steel (3'*4')	1
33	Tong	5
34	Tri square	2

35	Hammer 500gm	2
36	Bench drilling M/C ½"	1
37	Bench grinder	1
38	Chiesel 6"	2
39	Anvil	1
40	Work benches with four heavy duty vice	2

**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 Requirement:**

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