

9. RESOURCE REQUIREMENTS

9.1 Physical Resources

9.1.1 Equipment Requirement:

Sr. No.	Description	Qty	Total Price (Rs)
CARPENTRY SHOP			
1	Work benches fitted with carpenter vices	5	20,000
2.	Circular saw grinder	1	6,000
3.	Wood cutting band saw-vertical	1	10,000
4.	Bench grinder	1	5,000
5.	Drilling machine	1	8,000
6.	Wood turning lathe	1	40,000
7.	Wood Planner	1	20,000
8.	Tool accessories measuring and marking Instruments	25	25,000
9.	Band saw blade brazing unit	1	10,000
FITTING AND PLUMBING SHOP			
1.	Work benches with vices (4 vices on each bench)	5	30,000
2.	Marking tables with scribes	4	24,000
3.	Surface plates	5	20,000
4.	Bench grinders	1	6,000
5.	Drilling machine	2	12,000
6.	Power Hacksaw	1	20,000
7.	Sheet Bending Machine	1	40,000
8.	Tool kits – taps, dies, drills	25	40,000
9.	Tool kits – chisels, hammers, files, hacksaw	25	25,000
10.	Accessories like calipers, V blocks, height, gauges steel rules and scribes	25	50,000
11.	Pipe vice	4	1,000
12.	Chain wrenches	5	1,250
13.	Ring spanner set	5	600
14.	Pipe die set 2"	2 set	1,000

15.	Pipe bending device	1	5,000
16.	Various plumbing fitting	LS	2,000
FOUNDRY SHOP			
1.	Moulding boxes	40	8,000
2.	Ladles	5	2,000
3.	Tool Kits	10 set	5,000
4.	Quenching tanks	2	5,000
5.	Portable grinder	1	3,000
6.	Pit furnace with blower	1	10,000
PAINT SHOP			
1.	Spray gun with hose pine	1	1,000
2.	Paint brushes	20	2,000
3.	Paint/Varnish	LS	2,000
4.	Air Compressor with 2 hp motor	1 set	10,000
5.	Miscellaneous	LS	5,000
SMITHY SHOP			
1.	Blacksmithy forge (with open hearths, accessories to match the forge)	20	40,000
2.	Wrought iron anvils	20	20,000
3.	Swage blocks	4	8,000
4.	Blower with accessories, motor switch etc	1	6,000
5.	Work benches with vices	2	6,000
6.	Power hammer	1	20,000
7.	Tools and accessories – hammers, swages, tongs, pokers, pullers etc	20	10,000
WELDING SHOP			
1.	Electrical welding transformer set with accessories	3	30,000
2.	Gas Cutting Unit	1	3,000
3.	Work benches with vices	3	5,000
4.	Welding generator set	1	10,000
5.	Oxy acetylene welding set with accessories	1	7,000
6.	Acetylene generating set	1	6,000
7.	Electric welder tool kit	10	10,000
8.	Projection welding machine	1	15,000
9.	Brazing equipment with accessories	1	10,000
10.	Soldering irons	3	1,000

11.	Pedestal grinder	1	10,000
12.	Metal spraying gun	1	10,000
13.	Spot welder	1	25,000
14.	TIG welding set	1	1,00,000
15.	MIG welding set	1	1,00,000
16.	Welding Partition Screen	5	2,500
MATERIAL AND METALLURGY LABORATORY			
1.	Salt bath oil fired furnace	1	30,000
2.	Salt bath electric resistance furnace	1	40,000
3.	Electric furnace muffle type	1	60,000
4.	Forced circulation tempering furnace	1	30,000
5.	Quenching tank	2	5,000
6.	Work benches	2	4,000
7.	Pyrometers	1	1,000
8.	Pot for bailing out the salt	1	1,500
9.	Metallurgical microscope	1	35,000
10.	Abrasive cut off machine	1	50,000
APPLIED MECHANICS LABORATORY			
1.	Polygon of forces apparatus	1	1,000
2.	Apparatus for reaction at supports	1	1,000
3.	Jib crane	1	1,000
4.	Screw jack	1	300
5.	Inclined plane and friction apparatus	1	500
6.	Worm and worm wheel	1	1,500
STRENGTH OF MATERIALS LABORATORY			
1.	Brinell and Rockwell hardness tester	1	30,000
2.	Impact testing machine	1	20,000
3.	Microprocessor based universal testing machine	1	4,00,000
4.	Torsion testing machine (fully computerized)	1	2,00,000
ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY			
1.	Wattmeter	5	10,000
2.	Ammeter	5	10,000
3.	Voltmeter	5	7,500

4.	DC shunt motor	1	5,000
5.	Single phase variac	1	2,500
6.	Single phase transformer	1	5,000
7.	Resistive load	1	4,000
8.	Multimeter	1	4,000
9.	CRO	1	15,000
10.	Regulated supply	1	8,000
11.	Signal generator	1	5,000
12.	3-phase inductor motor	1	5,000
13.	3-phase variac	1	8,000
14.	DC shunt generator coupled with motor and starter	1	25,000
15.	Rheostat	2	2,500
16.	Tachometer	1	5,000
MECHANICAL WORKSHOP			
1.	Centre lathes	10	5,00,000
2.	Tool room lathe	1	1,00,000
3.	Lathe with copy turning attachment and other attachments	1	1,50,000
4.	Universal milling machine	1	1,25,000
5.	Vertical milling machine	1	75,000
6.	Shapers	2	1,00,000
7.	Radial drilling machine	1	25,000
8.	Upright drilling machine	1	20,000
9.	Gear Shaper	1	75,000
10.	Centreless grinder	1	80,000
11.	Universal cylindrical grinder	1	75,000
12.	Hydraulic surface grinder	1	50,000
13.	Tool and Cutter grinder	1	50,000
14.	Power hacksaw	1	25,000
15.	Pedestal grinder	1	5,000
16.	Electro discharge machine	1	4,00,000

17.	Work bench	3	6,000
18.	Precision instruments	1	5,000
19.	Surface plates	2	15,000
20.	Hand tools and accessories	2	6,000
21.	CNC trainer lathe	1	3,00,000
22.	CNC trainer milling machine	1	4,00,000
23.	PC Computer	2	1,00,000
24.	Computer based NC Programming Software	1	1,50,000
25.	CNC Simulation software	1	1,00,000
26.	CNC Milling machine accessories and holding devices	LS	1,00,000
	TOOL & DIE SHOP		
1	a) E.D.M wire cut machine	1	50 Lac
	b) E.D.M	1	10 Lac
2	Hydraulic Surface Grinder	2	5 Lac
3	Ram Type Milling machine	2	5 Lac
4	Heavy Duty bench vice & Work bench	20	1 Lac
5	Tool & Cutter Grinder	2	5 Lac
6	Horizontal/Universal milling machine	4	10 Lac
7	Cylindrical Grinder	1	5 Lac
8	Die Profile grinding machine	2	0.8 Lac
9	V-milling machine	2	5 Lac
10	Heavy Duty fitter's work bench	4	0.5 Lac
11	Surface Plate 0.5m*0.5m, 1m*1m	6	1.2 Lac
12	Radial Drilling machine	2	5 Lac
13	Bench Grinding Machine	2	5 Lac
14	Pedestal Grinder Wheel 200mm*20mm, 300mm*32mm	4	0.6 Lac
	HEAT TREATMENT SHOP		
1	Muffle furnace	4	0.4 Lac
2	Salt bath furnace	1	0.4 Lac
3	Induction furnace/heater	1	3 Lac
4	Double decker heating furnace	1	1.5 Lac
5	Open hearth furnace	2	0.2 Lac
6	Tank for water quenching	4	0.5 Lac

HYDRAULIC & PNEUMATIC LAB

Sr. No.	Name of Equipment	Quantity	Cost
1.	Piezometer tube	10	1000/-
2.	Hydraulic bench equipped with the following: a) Bernoulli's apparatus b) Venturimeter c) Orifice meter d) Pipe friction apparatus e) Apparatus for hydraulic coefficient C_c , C_v , and C_d . f) Centrifugal pump	1	4,00000/-
3.	Reciprocating pump single acting	1	6000/-
4.	Hydraulic jack	1	5000/-
5.	Working model of hydraulic circuits for surface grinder	1	10,000/-
6.	Working of Pneumatic circuits for any machine	1	10,000/-
7.	Pneumatic brake system	1	10,000/-
8.	Velocity meter	1	10,000/-

IQC LABORATORY

Sr. No.	Name of Equipment	Quantity	Cost
1.	Set of V-blocks	2	2,000/-
2.	Dial test indicator with magnetic stand	4	6,000/-
3.	Straight edge	2	20,000/-
4.	Vernier bevel protractor	2	20,000/-
5.	Comparators i) Mechanical ii) Electrical iii) Pneumatic	2	30,000/-
6.	Vernier height gauge	2	20,000/-
7.	Gear tooth micrometer	-	10,000/-
8.	Clinometers	-	5,000/-
9.	Talysurf	-	5,000/-
10.	Vernier caliper	3	1,200/-
11.	Micrometer	3	1,500/-
12.	Depth gauge	2	1,000/-
13.	Combination set	1	500/-
14.	Bevel protractor	1	500/-
15.	Sine bar	1	500/-
16.	Precision balls and rollers	1	200/-
17.	Surface plate	2	10,000/-

18	Slip gauges set	1	5,000/-
19	Gear tooth vernier	1	2,000/-
20	Snap and ring gauges	1	1,000/-
21	Feeler gauge, radius gauge	1 each	500/-
22	Angle plate	1	600/-
23	Tool makers microscope	1	20,000/-
24	Profile projector	1	40,000/-

CAD Lab

Sr. No.	Name of Equipment	Quantity	Cost
1.	Computer P-IV	10	3 Lac
2.	UPS	10	40,000/-
3.	Plotter	1	10,000/-
4.	Master cam software	1	-
5.	CATIA software	1	-
6.	Printer – Laser	2	50,000/-
7.	Printer – Inkjet	2	20,000/-

NOTE:I

In addition to above, laboratories in respect of physics, chemistry will be required for effective implementation of the course.

Provision for overhead projector, TV with VCR facility slide cum strip projector, TV with VCR facility slide cum strip projector, 16 mm film projector, photocopier, PC-XT facilities, duplicating machines, drafting machines etc has also to be made.

9.1.2 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.

9.1.3 Furniture Requirement

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

9.2 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

Following are the qualifications and experience for the teaching faculty and technical staff

<p><u>Lecturer</u> (5 No.) First class B.E./B.Tech in Mechanical Engineering/Production Engineering or equivalent</p>	NIL
<p><u>Sr.Lecturer</u> (1 No.) First class B.E./B.Tech in Mechanical Engineering/Production Engineering or equivalent</p>	5 years experience in teaching/industry/research at the level of Lecturer or equivalent
<p><u>Head of Department</u> (1 No.) M.E./M.Tech in Mechanical Engineering/Production Engineering or equivalent with first class at Bachelor's level</p>	8 years experience in teaching/industry/research at the level of Lecturer or equivalent
<p><u>Note:</u> Candidates from industry/profession with B.E/B.Tech first class in Mechanical Engineering/Production Engineering or equivalent and with recognized professional work experience equivalent to Master's degree and 8 years experience may also be eligible for the post of H.O.D.</p>	
<p><u>Workshop Superintendent</u> (1 No.) First class B.E./B.Tech in Mechanical Engineering/Production Engineering or equivalent OR Diploma first in class Mechanical Engineering/Production Engineering or equivalent</p>	2 years industrial experience 8 years industrial experience
<p><u>Instructor/Technician</u> Diploma first class in Mechanical Engineering/Production Engineering or equivalent OR ITI with CTI first class in tool and die trade.</p>	2 years practical experiences in teaching/industry at appropriate level
<p>(2 Nos.) <u>Foreman</u> (2 Nos.) First class diploma in Mechanical Engineering/Production Engineering or equivalent Or first class degree in Mechanical/Production Engineering.</p>	4 years practical experiences in Industry of die making or die fitting 8 years experiences in industry.

10. RECOMMENDATIONS FOR EFFECTIVE IMPLEMENTATION OF CURRICULUM

The following recommendations are made for effective implementation of this curriculum.

- a) While imparting instructions, stress should be laid on the development of practical skills in the students. For this purpose, as far as possible, classes should be conducted in the laboratories itself.
- b) Industrial visits should be organized as and when required to clarify the concepts, principles and practices involved. For this purpose, time has already been provided in student centered activities
- c) Extension lectures from professionals should be organized to impart instructions in specialized areas
- d) There is no need of purchasing very costly equipment. Efforts may be made to establish linkages with local industrial organizations
- e) Considerable stress should be laid on repair and maintenance of equipment
- f) Teachers should generate competitiveness among the students for the development of professional skills.
- g) Teachers should take working drawings from the industries and provide practices in reading these drawings
- h) Hobby clubs and other co-curricular activities be promoted to develop creativity in the students
- i) Teachers should be sent for training in the new areas incorporated in their curriculum
- j) Students should be given well thought out project assignments. This can help students in developing creativity and confidence in them for gainful employment (wage and self)

A **project bank** should be developed by the Mechanical Engineering (Tool & Die) Department in consultation with local industry.