

10. RESOURCE REQUIREMENTS

10.1 Physical Resources

10.1.1 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.

10.1.2 Equipment requirement

For three year diploma programme in Rubber Technology for student intake of 40, following laboratories and workshops are required corresponding to the curriculum structure suggested by the expert group:

- i) Physics Laboratory
- ii) Chemistry Laboratory
- iii) Mechanical Engineering Laboratory
- iv) Unit Operation Laboratory
- v) Electrical and Electronics Laboratory
- vi) Environment Engineering Laboratory
- vii) Rubber Testing/Quality Control Laboratory
- viii) Computer Laboratory
- ix) Basic Workshops
- x) Rubber Die and Mould Shop

The equipment required for laboratories/workshops for (i), (ii), (iii), (v), (viii) and (ix) will be as per the standard list approved by All India Council for Technical Education (AICTE). Equipment/Machinery requirement for laboratories/workshops needed for Rubber Technology course is given as follow.

Sr. No.	Particulars	Number
UNIT OPERATION LABORATORY		
1.	Centrifuge	01
2.	Ball Mill	01
3.	Mixer	01
4.	Roller mill	01
5.	Compressor, Wet Gas Meter, Blower	01
6.	Jaw Crusher	01
7.	Cyclone Separator	01
8.	Plate and frame filter press	01
9.	Sieve shaker	01
10.	Vacuum pump	01
11.	Packed column (Randomly packed with Raschig Rings)	01
12.	Agitating equipment	01
13.	Particle setting in fluids (Drag coefficient)	01
14.	Sedimentation apparatus (Measuring Cylinder, 1 lt)	01
15.	Determination of Friction loss through pipe	01
16.	Weirs, v-notch	01
17.	Centrifugal pumps, reciprocating pump, gear pump	01each
18.	Rotameter, Venturimeter, Orificemeter, pitot tube	01each
19.	Globe valve, check valve	01each
20.	Gatevalve	01each
21.	Reynolds apparatus	01
22.	Rotary Disc Filter, Vacuum Rotary Drum Filter	01each

ENVIRONMENT ENGINEERING LABORATORY		
23.	UV-Visible Spectrophotometer	01
24.	Stack Gas Monitoring Kit	01
25.	Oven with Temperature Controller and Forced Air Circulation Type	01
26.	B.O.D. Incubator	01
27.	Water Analysis Kit	01
28.	Gas Composition Analyser	01
29.	Gas Chromotograph	01
30.	High Volume Sampler	01
31.	Electrical Balance for weighing upto 1/10 of milligram (capacity 200 gms)	01
RUBBER DIE AND MOULD SHOP		
32.	HMT/Kirloskar Lathe, gear operated with motor 1.8 m size, 4 jaw < 3 jaw, chucks and center chuck	3
33.	Shaper MMM Loyal	2
34.	Radial drill machine micro meter	1
35.	Radial drill machine 25 mm size	1
36.	Grinder 250 mm size	1
37.	Universal milling machine with DRO system	1
38.	Vertical milling machine with DRO system	1
39.	HMT surface grinder with magnetic chuck size 800x400 mm	1
40.	Tool craft/praga pentrograph machine	1
41.	Fitter benches	15
42.	Vice 150 mm	30
43.	Electra 6040 M EDM (with DRO system x, y and z axis)	100
44.	Jig boring	1
45.	CNC Lathe	1

RUBBER PROCESSING LABORATORY		
46.	Hand operated injection molding machine 10 gms capacity with thermostat	4
47.	Hand operated injection molding machine 25 gms. Capacity	2
48.	Hand operated compression molding machine with thermostat 25 ton	1
49.	Blow molding machine with blower half litre	2
50.	Oven (1.2m x 0.6m x 0.8m) having 6 shelves	1
51.	Embossing machine	1
52.	Grinder cum polisher half HP	1
53.	Horizontal injection molding machine 120 gms capacity, hydraulic operated with pyrometric control	1
54.	Compression molding machine hydraulic operated 100 t	1
55.	PVC extruder 40 mm size, with motor cutter with haul up system for pipe and cable coating	Unit I each
56.	Rotogravure two colour kolsite/konark/windsor	
57.	Film blowing machine 19 mm size with blower and motor LD/LLDE/HD/HM	
58.	Extruder for blown film and die for granulation	
59.	Two roll mixing mill electrically heated 300 degree C maximum 300 mm with speed controller with gear (including watt meter)	
60.	Blender –Neoplast	
61.	Scrap Granulator	
62.	Horizontal injection molding machine 80 – 120 gms with micro processor attachment	
63.	Horizontal injection moulding semiautomatic – 28 gm capacity	

64.	Thermoforming/vacuum forming models	
RAW MATERIALS NEEDED PER YEAR		Quantity
65.	High impact – polystyrene	100 kg
66.	General purpose low impact polystyrene (transparent)	100 kg
67.	High density polyethylene	200 kg
68.	Low density polyethylene (LDP) and Linear low density polyethylene (LLDP)	200 kg
69.	Low density polyethylene (Blow molding grade)	100 kg
70.	PVC	100 kg
71.	Nylon 6, nylon 66	25 kg
72.	ABS	100 kg
73.	Acrylic	50 kg
74.	Polypropylene	150 kg
75.	Cellulose acetate	25 kg
76.	Melamine formaldehyde	200 kg
77.	Phenol formaldehyde	200 kg
78.	Urea formaldehyde	100 kg
79.	Plastic sheet 3 mm thickness	100 Nos
80.	Polyster resin	100 kg
81.	SAN(Syrene Acrylonitrite Copolymer)	25 kg
82.	Polyester (PETP)	25 kg
83.	PVC Sheets	1 roll

RUBBER MATERIAL/POLYMER LABORATORY		
84.	Softening point and HDT tester	1
85.	Hardness testing machines	1
86.	Impact testing machine	1
87.	Ring and ball apparatus for softening point	1
88.	Refracto meter	1
89.	Dean and Start apparatus for water content determination	1
90.	Photo colorimeter	1
91.	PH meter Auto Temp. compensation type Elico/Systromix	1
92.	Centrifuge (Lab Model)	1
93.	Vacuum drying oven with vacuum pump	1
94.	Industrial oven (hot air)	1
95.	Stirrers (magnetic and electrical)	6 Nos.
96.	Analytical balances	10 Nos.
97.	Heating mantles 500 w and 250 w	10 each
98.	Water bath	10 Nos.
99.	Water distillation unit Indian	1 No.
100.	Temperature regulators	5Nos.
101.	Vacuum pump	1
102.	Falling dart	1
103.	Tensiometer	1
104.	Film bursting test	1
105.	Tear tester (imported)	1
106.	Heat resistor (imported)	1
107.	Constant temperature bath	1

RUBBER TESTING AND QUALITY CONTROL LABORATORY		
108.	Specimen cutting press	1
109.	Strip cutter	1
110.	Hydraulic Press	1
111.	Two roll Mill	1
112.	Climatic/conditioning chamber	1
113.	Hot air oven	1
114.	Impactometer	1
115.	Bend Tester	1
116.	Rockwell Hardness tester	1
117.	Shore Hardness Tester	1
118.	Burst Strength Tester	1
119.	Dart Impact tester	1
120.	Water vapour permeability apparatus	1 Unit each
121.	Melt flow indexer	“
122.	Heat Distortion vicat softening point apparatus	“
123.	Martin heat stability tester	“
124.	Gloss meter	“
125.	Abbe refractometer	“
126.	Megaohm-meter	“
127.	Viscosity/molecular weight determination set up	“
128.	Spiral flow mould	“
129.	Cupflow mould	“
130.	Environmental stress cracking resistance tester (ESCR)	“
131.	Carbon black content tester	“
132.	Abrader	“
133.	Brook field viscometer	“

10.1.3 Furniture Requirement

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

10.2 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.

10.3 Staff Structure

Sr.No,	Name of the Post	No. of Post	Qualification
1.	Head of Department	01	B.Tech/B.E. Plastic/Polymer Science/Polymer Engineering with 5 years experience
2	Lecturer(Rubber & Plastic)	03	B.E./B.Tech. in Plastic/Polymer Science/Polymer Engineering
3	Lecturer, Chemical Engg.	01	B.Tech/B.E.in Chemical Engineering
4	Lab. Assistant	04	ITI in relevant trade
5	Peon	01	8 th Pass