

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 Chemical Engineering (Specialization in Paint 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 and Fluid Mechanics Laboratory
- v) Electrical and Electronics Laboratory
- vi) Heat and Mass Transfer Laboratory
- vii) Environment Engineering Laboratory
- viii) Instrumentation and Process Control
- ix) Computer Laboratory
- x) Basic Workshops
- xi) Paint Laboratory

The equipment required for laboratories/workshops for (i), (ii), (iii), (v), (ix) and (x) will be as per the standard list approved by All India Council for Technical Education (AICTE). Equipment/Machinery requirement for laboratories/workshops needed for Chemical Engineering course is given in the following pages.

Sr. No.	Particulars	Number
UNIT OPERATION AND FLUID MECHANICS 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 measuring apparatus	01
22.	Rotary Disc Filter, Vacuum Rotary Drum Filter	01each
HEAT AND MASS TRANSFER LABORATORY		
23.	Double Pipe Heat Exchanger	01
24.	Shell and Tube Heat Exchanger	01
25.	Coiled Evaporator	01
26.	Single Effect Evaporator	01
27.	Boiler House	01
28.	Condenser	01
29.	Open Pan Evaporator	01
30.	Batch Distillation Apparatus	01
31.	Oven	01
32.	Extractor	01
33.	Packed Column	01
34.	Dryer (Tray)	01
35.	Spray Dryer	01
36.	Steam Distillation Apparatus	01
INSTRUMENTATION AND PROCESS CONTROL LABORATORY		
37.	On-off controller	01
38.	Piezo meter	01
39.	LVDT (Linear Voltage Difference Transfer) apparatus	01

40.	Light deflection distance meter	01
41.	Strain gauge	01
42.	Displacement meter	01
43.	Pyrometer	01
44.	Optical Pyrometer	01
45.	Thermopiles	01
46.	Resistance thermometer	01
47.	Gas filled thermometer	01
48.	Vapour filled thermometer	01
49.	Bimetallic thermometer	01
50.	Pitot tube	01
51.	Orifice meter	01
52.	Pneumatic gauge	01
53.	Hydraulic gauge	01
54.	Proportional controller	01
55.	Micro processor based distillation column controller, heat exchanger, evaporator	01each
56.	Check valve, butter fly valve, blind valve	01each
57.	PID, PD and PI controller	01each
58.	Electronic Microprocessor Based Balance 300 Gr.	01
59.	Rapid moisture tester	01
60.	Automatic rapid moisture tester	01
61.	Air compressor (single stage)	01
62.	Constant Stress Rotational Viscometer	01
63.	Infra red moisture meter	01
64.	Viscometer falling Ball type	01
65.	Air compressor with automatic control switch	01
66.	Stop watch	02
67.	Platinum resistance thermometer	01
68.	Thermo couple with indicator and control recorder	01
69.	Recording type gas/vapour filled thermometer (single pen)	01
70.	Pressure transducer with indicator	01
71.	Rota meter cap. (4 to 40 Lt)	02
72.	Pneumatic control valve (diaphragm type)	01
73.	Float and tape type liquid level measuring depth	01
74.	Flap and nozzle arrangement for demonstration	01
75.	Pressure regulator with air filter niddle	01
76.	M.S. tanks 1.5x1x0.7 M	03
77.	M.S. tank cylindrical with inlet and outlet type	06
78.	Bourdan pressure gauge(0-100 lb/in ² , 0-30 inch Hg vacuum	03
79.	Tullu pump of minimum capacity	03
80.	Auto transformer	03
81.	Servo stabilizer(110-220V) 10 K Watt	02
82.	Millivoltmeter, Milliammeter, Micrometer	03
83.	Hot plate heater/water heater	02
84.	Redwood viscometer as per I.S. 1448 and I.P. 70 with stop watch	01

85.	Measuring flasks (50 ml)	01
86.	Thermometers IPSC	01
87.	Low range thermometer	01
88.	Medium range thermometer	01
89.	High range thermometer	01
90.	Engler viscometer IS 434 and AS IM 490 with stopwatch and measuring flasks (200 to 240 ml) Thermometers ASTM 23°C Thermometers ASTM 24°C Thermometers ASTM 25°C	01
91.	Saybolt viscometer ASTM 58 with stop watch and measuring flask 60 ml Thermometers ASTM 17°C Saybolt ASTM 22°C Saybolt ASTM 18°C	01
92.	Pensky Martin flash and fire point apparatus as per IP 36/67 and ASTM D-92 open cup types with Thermometers I.P. 28°C	01
93.	Smoke Point apparatus as per IP 2 with Thermometers I.P. 20°C to I.P. 21°C	01
94.	Cloud and Pore Point Apparatus as per IP 15 and IS 1448 with Thermometers I.P. – I.C. (loud and pore point) I.P. 2°C	01
95.	Penetrometer as per I.P. 49 and IS 1448 with Thermometers I.P. 38°C	01
96.	Photo Electric Calorimeter with filters	01
97.	Hydrometer IP 160	01
98.	Carbon Residue (Rams Bottom) IS 1448 and 14/65	01
99.	Carbon Residue (conradson) IP 13/42	01
100.	Distillation of petroleum Product IP 123/68	01
101.	Colour by Lovibound Tinfometer	01
PAINT LABORATORY		
102.	Lovi bond Tintometer	01
103.	Ball Mill (10 lit)	01
104.	Ford Cup No.40	01
105.	Viscosity/Viscomitry Apparatus	01
106.	Softening Point Apparatus	01
107.	Abrasion Apparatus	01
108.	Adhesion Apparatus	01
109.	Application Apparatus	01
110.	Coating Thickness Apparatus	01
111.	Colour Thickness Apparatus	01
112.	Corrosion Control Apparatus	01
113.	Deformation Apparatus	01
114.	Dispersion Apparatus	01
115.	Drying time Apparatus	01
116.	Fineness of Grind Apparatus	01
117.	Gloss Apparatus	01

118.	Hardness Apparatus	01
119.	Moisture Measurement Apparatus	01
120.	Opacity Apparatus	01
121.	Orange Peel Apparatus	01
122.	Pin Hole & Porosity	01
123.	Specific Gravity Density Apparatus	01
124.	Temperature, pH and Conductivity Apparatus	01

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. Chemical Technology (Paint) with 5 years experience
2	Lecturer	03	B.Tech, Chemical Technology (Paint)
3	Lecturer	01	B.Tech/B.E. Chemical Engineering
4	Lab. Assistant	04	ITI
5	Peon	01	8 th Pass