

9. RESOURCE REQUIREMENTS

9.1 Physical Resources

9.1.1 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.

9.1.2 Equipment requirement

For three year diploma programme in Chemical Engineering for student intake of 30, 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, Electronics Laboratory
- vi) Heat and Mass Transfer Laboratory
- vii) Environment Engineering Laboratory
- viii) Instrumentation and Process Control
- ix) Computer Lab.
- x) Basic Workshops; Forging; Fitting and Assembly; Carpentry; Welding; Electrical Shop; Molding; Turning, Milling; Advanced Fitting; Grinding Advanced Machine Shop

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	Unit 1 each
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 pumps	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	01
18.	Redwood Viscometer	01
19.	Rotameter, Venturimeter, Orificemeter, pitot tube	01
20.	Globe valve, check valves	01
21.	Gatevalve	01
22.	Reynolds measuring apparatus	01
23.	Rotary Disk Filter, Vacuum Rotary Drum Filter	01
HEAT AND MASS TRANSFER LABORATORY		
24.	Double Pipe Heat Exchanger	01
25.	Shell and Tube Heat Exchanger	01
26.	Coiled Evaporator	01
27.	Single Effect Evaporator	01
28.	Boiler House	01
29.	Condenser	01
30.	Open Pan Evaporator	01
31.	Batch Distillation Apparatus	01
32.	Oven	01
33.	Extractor	01
34.	Packed Column	01
35.	Dryer (Tray)	01
36.	Spray Dryer	01
37.	Stem Distillation Apparatus	01

ENVIRONMENT ENGINEERING LABORATORY		
38.	UV-Visible Spectrophotometer	01
39.	Stack Gas Monitoring Kit	01
40.	Oven with Temperature Controller and Forced Air Circulation Type	01
41.	B.O.D. Incubator	01
42.	Water Aanlysis	01
43.	Gas Composition Analyser	01
44.	Gas Chromotograph	01
45.	High Volume Sampler	01
46.	Electrical Balance for weighing upto 1/10 of milligram (capacity 200 gms)	01
INSTRUMENTATION AND PROCESS CONTROL LABORATORY		
47.	On-off controller	01
48.	Piezo meter	01
49.	LVDT apparatus	01
50.	Light deflection distance meter	01
51.	Strain gauge	01
52.	Displacement meter	01
53.	Pyrometer	01
54.	Optical Pyrometer	01
55.	Thermopiles	01
56.	Resistance thermometer	01
57.	Gas filled thermometer	01
58.	Vapour filled thermometer	01
59.	Bimetallic thermometer	01
60.	Pitot tube	01
61.	Orifice meter	01
62.	Pneumatic gauge	01
63.	Hydraulic gauges	01
64.	Proportional controller	01
65.	Micro processor based distillation column controller, heat exchanger, evaporator	01
66.	Check valve, butter fly valve, blind valve	01
67.	PID, PD and PI controller	01

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 Development:

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. 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.
- b) Field visits be organized as and when required to clarify the concepts, principles and practices involved. For this purpose, time has already been provided in student centred activities
- c) Extension lectures from professionals should be organised to impart instructions in specialised areas
- d) There is no need of purchasing very costly equipment. Efforts may be made to establish linkages with local industries/field organizations
- e) Considerable stress should be laid on personality development of the student, which is very essential for any diploma holder
- f) Teachers should generate competitiveness among the students for the development of professional skills.
- g) Teachers should take interest in establishing linkages with industries and field organizations for imparting field experiences to their students
- 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 relevant to their field of specialization
- j) Students should be given relevant and well thought out project assignments. This will help students in developing creativity and confidence in them for gainful employment (wage and self)
- k) A **project bank** should be developed by the Chemical Engineering department of the polytechnic in consultation with Chemical Industry, Chemical Research Institutes and other important chemical institutions in the state.

11. LIST OF PARTICIPANTS

The following experts participated/contributed in the revision of curriculum for diploma programme in **Chemical Engineering** during the workshop for revision of subjects of first year for Haryana state held on 13th May, 2003 at National Institute of Technical Teachers' Training and Research, Chandigarh.

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From Polytechnics

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7. Mr. Ajay Goel, Lecturer, Government Polytechnic, Sonapat

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4. Mrs. Rama Chhabra, Senior Lecturer, IMCO
5. Mrs. Poonam Likhi, Assistant Professor, Curriculum Development Centre **(Coordinator)**

The following experts participated/contributed in the revision of curriculum for diploma programme in **Chemical Engineering** during the workshop for revision of complete Curriculum for Haryana state held from 04 – 06 August, 2003 at National Institute of Technical Teachers' Training and Research, Chandigarh.

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