ECONONMICS

To find the Cost of Equipments:

The cost of equipments used are given in table 25-49 Perry as follows

Equipment	Size	N	Cost (Rs)
Reactor	0.38 m^3	0.53	465000
Surge Tank	3.8 m^3	1	235000
Centrifuge	1.86 m^2	0.65	5000000
Rotary Drier	51.11 m^3	0.64	16000000
Condenser	9.3 m^2	0.59	1085000
Distillation Column	4000 (trays)	1	165000000
Pumps	74.6 KW	0.67	220000

To calculate the cost of equipment of required size

$C_2 = C_1 (Q_2/Q_1)^n$

Therefore the cost of the equipments are given below

Equipment	Number	Cost
Reactor	1	8915950
G-L Seperator	1	1783190
Surge Tank	1	3092105
Centrifuge	1	14920610
Rotary Drier	1	22737950
Condenser	3	17052312
Reboiler	2	11368208
Distillation Column	2	12375000
Pumps	4	922184
Storage Tanks	2	6184210

Total Equipment Cost (Purchased Equipment Cost) = **Rs 9,93,51,719**

Other Costs (OC):

Installation Costs = 20% x PEC = Rs19870344

Instrumentation Costs = 10% x PEC = Rs 9935172

Piping Costs = 31% x PEC = Rs 30799033

Electrical Costs = Rs 1300000

Building Costs = 6% x PEC = Rs 5961103

Installed equipment cost = Rs 2463440

Insulation costs = 8% x PEC = Rs 7948138

Total Cost = **Rs 7,82,77,230**

Direct Plant Cost (DPC) = PEC + OC = Rs 177628949

Engineering supervision & Construction Expenses = 25% x PEC = Rs 24837930

Total Direct and Indirect Plant Costs:

Contractor's fee = 5% x DPC = Rs 1241897

Contingency fee = 10% x DPC = 2483793 Rs

Fixed Capital Investment (FCI) =Rs 206192570

Working Capital (WC) = 20% x PEC = Rs 19870344

Total Capital Investment (TCI) = FCI + WC

= **Rs 22,60,62,914**

Manufacturing Cost Estimation:

Direct Production Cost

Raw Material Cost

Acetic Acid : Rs 28 x 499 x 10^3 x 330 = 4.611 x 10^9 Rs/yr

p-Xylene: Rs 27 x 37.5 x 10^3 x 330 = 3.34125 x 10^8 Rs/yr

Total raw material cost = **4.945 x 10^9 Rs/yr**

To calculate the production Cost:

Let the total production cost be Rs. Y/yr

Operating Labor = 0.1 Y/yr

Direct Supervision and clerical labor = 0.01 Y/yr

Maintenance and repair cost (Assuming a 10yr life) = 0.02 x (FCI/10) = 412385.1/yr

Utilities = 0.1 Y/yr

Operating supplies = 0.01(FCI/10) = 206193 Rs/yr

Patents and Royalties = 0.03 Y/yr

Laboratory Charges = 0.01 Y/yr

Fixed Charges:

Depreciation:

Assuming a 10 year life for equipment and machines,

Depreciation = Total Equipment Cost / 10 = 99351719/10 = 9935172 Rs/yr

Assuming a 50 year life for buildings,

Depreciation = Cost of Buildings/50 = 5961103/50 = 119222 Rs/yr

Total Depreciation = **10054394 Rs/yr**

Plant overhead costs **=** 0.05 x Y/yr

General Expenses

Administration Cost = 0.02 x Y/yr

Distribution and Selling Cost = 0.05 x Y/yr

Research and Development cost = 0.02 x Y/yr

Total Production Cost (TPC)

TPC = MC + GE

Y = 0.01Y+0.01Y+412385.1+0.1Y+206193+0.03Y+0.01Y+10054394+0.05Y+0.02Y
+0.05Y+ 0.02Y + 4.945×10^9

Y = $(4.9557 \times 10^9)/(0.7)$ = **7.079×10^9 Rs/yr**

Selling Price = Rs 29/kg (Technical Grade)

Total Selling Price/yr = $29 \times 750 \times 10^3 \times 330$ = **7.178×10^9 Rs/yr**

Gross Earning = **9.85×10^7 Rs/yr**

Rate of Return:

Let tax rate be 45% (common)

Net profit = 9.85×10^7 (1-0.45) = **54175000 Rs/yr**

Rate of Return = (54175000X100)/ 226062914 = **23.96%**