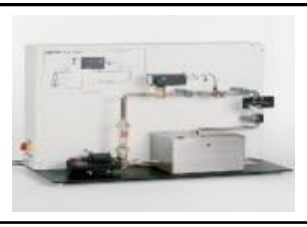
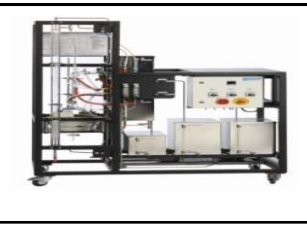
Chemical Engineering Department – Teaching Equipment

S/N	Equipment	Description		Location	Course
1	**Cooling Tower (Computer Controlled Bench Top) Manufacturer: Edibon Model: TTEC**	The Basic Cooling Tower is used to introduce to the students the characteristics and construction of the mechanical draft cooling tower. This operates with moderate air and water flows with 0.5, 1.0 or 1.5 kW cooling loads.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab
2	**Distillation Column Manufacturer : Armfield Model: UOP3CC**	The unit is a self-contained and fully instrumented distillation facility, suitable for practical laboratory work relevant to the teaching of unit operations. The equipment employs galvanically isolated intrinsically safe circuits and flameproof devices as appropriate, to enable safe distillation of standard test mixtures such as methylcyclohexane-toluene, methyl alcohol-water etc.The equipment consists of two interconnected units: a floor standing process unit and a bench-mounted control console.		G 224	CHME 325 Unit Operation Lab
3	**Fixed and Fluidized Bed Apparatus Manufacturer : Armfield Model: CELMkII**	The apparatus is designed to facilitate the study of flow through fixed and fluidized beds of solid particles. There is Provision for the simultaneous study of air and water systems in the unit to demonstrate the difference between 'aggregative' and 'particulate' fluidized bed characteristics. Students can readily observe the important phenomenon of bubbling'. Upward flow of fluid through a bed of particles is a naturally occurring phenomenon, for example the movement of ground water. Industrial applications include ion-exchange, extraction of soluble components from raw materials and other chemical processes		G 224	CHME 325 Unit Operation Lab

4	**Fixed Bed Adsorption Unit** **Manufacturer : Armfield** **Model: UOP15**	UOP15 demonstrates the adsorption of a solute, carbon dioxide, from a binary gas mixture onto the surface of a solid adsorbent, activated carbon. The process takes place in a fixed bed adsorption column.		G 224	CHME 325 Unit Operation Lab
5	**Flow Control Training System** **Manufacturer : Gunt** **Model: RT 020**	he combination of the clear, real-world controlled system and simulations of other controlled systems in the RT 010 – RT 060 device series aids understanding. Preparations for the experiments, as well as software simulations can be carried out in Remote Learning environments. The experiments can be observed at any number of workstations on the local network.		G 228	CHME 426 Reaction Engineering & Process Control Lab
6	**Heat Exchanger Service unit** **Manufacturer : Gunt** **Model: WL110**	It is used to determine the overall heat transfer coefficient, temperature efficiency for different types of heat exchanger, and to study the effect of varying hot fluid flow rate on heat transfer coefficient.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab
7	**Radial & Linear Heat Conduction** **Manufacturer : Gunt** **Model: WL 372**	It is used to find the thermal conductivity of brass.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab
8	**Reverse Osmosis System** **Manufacturer : ElettronicaVeneta** **Model: OI/EV**	It is used to determine the effect of varying feed pressure and temperature for constant feed concentration operation on permeate flow rate and permeate concentration in a reverse osmosis process.		G 228	CHME 426 Reaction Engineering & Process Control Lab

9	**Series and parallel connected pumps** **Manufacturer : Gunt** **Model: HM 284**	The experimental unit provides the determination of the characteristic behavior for single operation and interaction of two pumps. HM 284 features a closed water circuit with a water tank and two centrifugal pumps with drive motors. The speed of one motor is variably adjustable by a frequency converter. The other pump is fitted with a motor with fixed speed, this pump can be added to the system. The impellers of both pumps are mounted in transparent housings and can be observed during operation. Valves enable to easily switch change between single pump, series or parallel pump operation. The system behaviour is analyzed with the aid of a valve at the outlet of the pump adjusting the flow resistance.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab
10	**Gas Absorption Column** **Manufacturer : Edibon** **Model: CAG**	This apparatus is used to determine the air pressure differential across the column as a function of air flow rate at different water flow rates down the column, and flooding point can be noted. The absorption process of carbon dioxide from the air-CO2 mixture into caustic soda solution, is also studied using this system.		G 224	CHME 325 Unit Operation Lab
11	**Unsteady State Heat Transfer** **Manufacturer : Tecquipment Academia** **Model: TD1009 – Unsteady State Heat Transfer**	It is used to validate lumped capacity unsteady state heat transfer model.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab
12	**Flow Meter Trainer System** **Manufacturer : Tecquipment Academia** **Model: H10 – Flow Measurement**	It is used to demonstrate the application of flow meters (venture and orifice meter) in the measurement of flow rate and velocity in a pipe.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab

13	**Gaseous Diffusion Coefficient Apparatus** **Manufacturer : Armfield** **Model: CERA-A**	This apparatus is used to determine the diffusion coefficient of a gas by evaporation from a liquid surface of the acetone - air system.		G 224	CHME 325 Unit Operation Lab
14	**Level Control Demonstration Unit** **Manufacturer : Gunt** **Model: RT 614**	It is used to study the proportional (P), proportional integral (PI) and proportional integral derivation (PID) control action on level control of a vessel.		G 228	CHME 426 Reaction Engineering & Process Control Lab
15	**Liquid Liquid Extraction Unit** **Manufacturer : Gunt** **Model: CE 620**	transition of a component from a two-component liquid mixture into a solvent by extraction, scale-up from beaker experiment to pilot plant scale, enrichment of transition component in extract by distillation, evaluation of separation processes via concentration measurement and mass balances, influence of different experimental options on separation processes		G 224	CHME 325 Unit Operation Lab
16	**Solid Liquid Extraction Unit** **Manufacturer : Gunt** **Model: CE 630**	The solid mixture (extraction material) is produced prior to the extraction experiment. The carrier material (granular aluminium oxide) is fed into a salt solution (potassium hydrogen carbonate dissolved in water). The carrier material soaked with the salt solution is then dried.		G 224	Not Assigned
17	**Stirred Tank Reactors in Series** **Manufacturer : Armfield** **Model: CEP**	It is used to determine the degree of conversion and the rate of reaction of sodium hydroxide and ethyl acetate through 3 continuous stirred tank reactor connected in series, and to compare the performance of three CSTR in series with the one CSTR having volume equal to the sum of three.		G 228	CHME 426 Reaction Engineering & Process Control Lab

		It is also used to determine the effect of step change in input concentration on the response of a system comprising three tanks in series.			
18	**Temperature Control Trainer** **Manufacturer : Gunt** **Model: RT 542**	This trainer provides a comprehensive experimental introduction to the fundamentals of control engineering using an example of temperature control.		G 228	CHME 426 Reaction Engineering & Process Control Lab
19	**Tray Dryer (Computerized)** **Manufacturer : Armfield** **Model: UOP8-MKII-A**	Small scale tray dryer which drys solids by passing a stream of hot air over the trays of wet material. this is the method commonly used for drying materials in the industry. This unit is applicable to the unit operations laboratory of educational establishments and also for food technology education and research.		G 224	CHME 325 Unit Operation Lab
20	**Tubular Chemical Reactor** **Manufacturer : Armfield** **Model: CEX-A**	It is used to find the reaction rate constant for the liquid phase reaction of caustic soda and ethyl acetate, and to study the effect of feed flow rate on the extent of reaction.		G 228	CHME 426 Reaction Engineering & Process Control Lab
21	**Wetted Wall Gas Absorption Column** **Manufacturer : Pignat** **Model: AWC/1000**	Wetted wall columns may be used to determine gas/liquid mass transfer coefficients, essential when calculating the design of absorption towers. Such coefficients form the basis of correlations used to develop packed towers. CES examines the absorption of oxygen from air into deoxygenated water (prepared by nitrogen sparging). This is an example of liquid film controlled absorption. The liquid film mass transfer coefficient can be determined at various mass flow rates of water.		G 224	CHME 325 Unit Operation Lab

22	**Chemical Reactor Trainer** **Manufacturer : Gunt** **Model: CE 310**	It consists of two units – one is CSTR, the other one is batch reactor. For CSTR - it is used to find the reaction rate constant for the liquid phase reaction of caustic soda and ethyl acetate, and also for determining the activation energy and pre-exponential factor using the Arrhenius equation. Batch reactor is used to determine the order of reaction, rate constant, frequency factor and activation energy.		G 228	CHME 426 Reaction Engineering & Process Control Lab
23	**Fluid Friction Measurement Unit** **Manufacturer : infinit-technologies** **Model: FM-1849-26**	It is used to study the pressure loss due to friction for fluid flow along pipes of different diameters. It is used to study head losses through some common type of fittings and valve.		G 224	CHME 324 Fluid Mechanics & Heat Transfer Lab