Course Number and Name
BME005 - DESIGN OF HEAT EXCHANGERS
Credits and Contact Hours
3&45
Course Coordinator's Name
Mr.Thirumavalavan
Text Books and References
TEXTBOOK: 1.R.K.Rajput- Heat and mass Transfer- S Chand Publications, Jan 2008 **REFERENCES:** 1. Sadik Kakal & Homgton Lin – Heat Exchangers – CRC Press, London, 1998. 2. Arthur.P.Fraas, - Heat exchanger Design, John Willey & Sons, 1997. 3. Kenn.D, - Process heat transfer – Tata McGraw Hill, 1980. 4. Holger Martin - Heat exchangers – Hemi sphere Publishing Corporation, London. 5. https://www.crcpress.com/**Heat-Exchanger-Design**-Hand**book/**.../978142...
Course Description
To learn the sizing of heat exchangers, thermal and mechanical stress analysis for various heat exchange applications.

Prerequisites	Co-requisites
Nil	HEAT AND MASS TRANSFER

required, elective, or selected elective (as per Table 5-1)
Core Elective

Course Outcomes (COs)	
CO1	Will understand concepts and working principle of heat exchangers.
CO2	Will understand shell and tube type heat exchanger design.
CO3	Will able to do compact heatexchanger design.
CO4	Will understand the concept of condenser and evaporator.
CO5	Student learns about cooling tower
CO6	Student understands installation of cooling tower

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	H											
CO2			H		L				H		L	
CO3	H					M						
CO4			H		L		M					L
CO5									H			

CO6	H				L							L	

List of Topics Covered

UNIT I DOUBLE PIPE HEAT EXCHANGERS & HEAT PIPES 9

Thermal And Hydraulic design – Inner pipe – Annulus, Hairpin heat exchanger – Basic inner tube – Finned multi tubes – Parallel and series arrangements – Pressure drop, Constructional features. Heat pipes – Structures – Applications – Basic relations – Performance characteristics – Effect of working fluid and operating temperatures, Wick – Selection of materials – bore size.

UNIT II SHELL AND TUBE HEAT EXCHANGERS 9

Basic components – shell – tube bundles – baffles – type and geometry, design procedure – preliminary estimation of size, pressure drop and Heat transfer calculations – shell and tube sides – Kenn method – Bell – Delaware methods.

UNIT III COMPACT HEAT EXCHANGERS & GASKETTED PLATE HEAT EXCHANGERS 9

Compact Heat Exchangers – types – constructional features, heat transfer and pressure drop calculations – Finned plate and tube.Gasketted plate Heat Exchangers - constructional features plate, pack and flame – Operational characteristics – Flow arrangements, Heat transfer and pressure drop calculations, Performance analysis, Comparison with other types of heat exchangers.

UNIT IV CONDENSERS & EVAPORATORS 9

Shell and tube condensers – Horizontal and vertical types – Design and operational consideration, Plate condensers, Air cooled and direct contact type condenser for refrigeration, Evaporative condensers.Evaporators for refrigeration and air conditioning – Chillers – air coolers – thermal analysis – Shah, Kandhkar and Ghnkor and Winterom Correlations, Standard types.

UNIT V COOLING TOWERS 9

Cooling towers - Types – Basic relation – Heat balance and heat transfer characteristics and effect of packing – Geometry, Spray design, Selection of pumps, fans, testing, Maintenance, environmental effects, wind load, typical installations.