M.E Semester: 2 Mechanical Engineering (Thermal Engineering)
Subject Name: DESIGN OF HEAT EXCHANGE EQUIPMENTS

A. **Course Objective**

- To present a problem oriented in depth knowledge of Design Of Heat Exchange Equipments
- To address the underlying concepts and methods behind Design Of Heat Exchange Equipments

B. **Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
METH203	Design of Heat Exchange Equipments	3	0	2	5	4	3	70	30	20	30	150

C. **Detailed Syllabus**

1. Classification of heat exchangers, basic design methods for heat exchangers,
2. Design of tube in tube and shell and tube heat exchangers, TEMA code
3. Power plant heat exchangers, heat exchangers for heat recovery at low, medium and high temperatures, computerized methods for design and analysis of heat exchangers, compact heat exchangers,
4. Principles of boiler design, codes for mechanical design of heat exchangers,
5. Performance enhancement of heat exchangers, fouling of heat exchangers, testing, evaluation and maintenance of heat exchangers.

D. **Lesson Planning**

Sr.No.	Date/Week	Unit No.	% Weightage	Topic No:
1	1^{st} ,2^{ed} ,3^{ed}	Unit 1	20 % .	1
2	4^{th} ,5^{th} ,6^{th}	Unit 2	20 %	2
3	7^{th} ,8^{th} ,9^{th}	Unit 3	20 %	3
4	19^{th} ,11^{th} ,12^{th}	Unit 4	20 %	4
5	13^{th} ,14^{th} ,15^{th}	Unit 5	20 %	5

E. **Instructional Method & Pedagogy**

1. At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
8. Experiments shall be performed in the laboratory related to course contents.

9. List of Experiments:

1. Study of fundamentals of Fluid Flow and Heat Transfer associated with heat exchangers.
2. Design of heat exchange equipment by using method of LMTD.
3. Design of heat exchange equipment by using method of ε – NTU.
4. Design and analysis of Parallel flow and Counter flow heat exchanger.
5. Design and analysis of Shell and tube type heat exchanger.
6. Design and analysis of Plate type heat exchanger.
7. Design of evaporator and condenser for refrigeration system.
8. Design of cooling and air conditioning circuit.
9. Design and analysis of regenerative type heat exchanger for low temperature applications.
10. Case study on design of heat exchanger for process industry.

F. **Students Learning Outcomes**

- The student can identify different areas of Design Of Heat Exchange Equipments
- Can find the applications of all the areas in day to day life.

G. **Recommended Study Materials**

- **Text & Reference Books:**

1. Saunders, E.A.D., "Heat Exchangers – Selection Design and Construction", Longmann Scientific and Technical, N.Y., 2001.
2. Kays, V.A. and London, A.L., "Compact Heat Exchangers" , McGraw Hill, 2002.
3. Holger Martin, "Heat Exchangers" Hemisphere Publ. Corp. , Washington, 2001.
4. Kuppan, T., "Heat Exchanger Design Handbook", Macel Dekker, Inc., N.Y. , 2000
5. Seikan Ishigai, "Steam Power Engineering, Thermal and Hydraulic Design Principles", Cambridge Univ. Press, 2001.