SHRI VENKATESHWARA UNIVERSITY

Syllabus

M. TECH
Thermal Engineering
(Part -Time)
II Semester

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

M.Tech Thermal Engineering (Part Time) SEMESTER-II													
Sl. No.	**Subject Codes**	**Subject**	**Periods**			**Evaluation Scheme**				**End Semester**			
			L	**T**	**P**	**CT**	**TA**	**Total**	**PS**	**TE**	**PE**	**Total**	**Credit**
1	WTE-201	Advanced Heat Transfer	3	1	0	20	10	30		70		100	4
2	WTE-022	Design of Heat Exchangers	3	0	0	20	10	30		70		100	3
3	WTE-211	Advanced Heat Transfer Lab	0	0	4				25		25	50	2
4	AUD-102	Disaster Management	2	0	0								0
		Total										**250**	**9**

WTE-201 Advanced Heat Transfer

Course Outcomes:

At the end of the course:

1. The students are expected to understand the subject of Heat Transfer in detail with capability to solve Industrial Problems. This will also create the base and interest among the students to carry out the Future Research

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Unit 1

Conduction- one and two dimensional, Fins, conduction with heat source, unsteady state heat transfer,

Unit 2

Natural and forced convection, integral equation, analysis and analogies,Transpiration cooling, ablation heat transfer, boiling, condensation and two phase flow mass transfer, cooling, fluidized bed combustion,

Unit 3

Heat pipes, Radiation, shape factor, analogy, shields,

Unit 4

Radiation of gases & vapours.

References:

1. J.P. Holman, "Heat Transfer", McGraw Hill Book Company, New York, 1990.
2. Incropera and Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley and Sons, NewYork, 2000.
3. Frank Kreith, "Principles of Heat Transfer", Harper and Row Publishers, New York, 1973.
4. Donald Q. Kern "Process Heat Transfer", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1975.
5. Gupta and Prakash, "Engineering Heat Transfer", New Chand and Bros, Roorkee (U.P.) India, 1996.
6. R.C. Sachdeva "Fundamentals of Engineering Heat and Mass Transfer", Wiley Eastern Ltd., India,

WTE-022 Design of Heat Exchangers

Course Outcomes:

At the end of the course:

1. Students will demonstrate a basic understanding of several types of heat exchangers that will include shell-and-tube, double pipe, plate-and-frame, finned tube, and plate- fin heat exchangers, Heat pipes.
2. Students will design and analyses of shell-and-tube double pipe, compact, plate heat exchangers**.**
3. Students will demonstrate the performance degradation of heat exchangers subject to fouling.

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Unit 1

Heat Exchangers – Classification according to transfer process, number of fluids, surface compactness, and construction features. Tubular heat exchanger, plate type heat exchangers, extended surface heat exchangers, heat pipe, Regenerators. Classification according to flow arrangement: counter flow, parallel flow, cross flow exchanger. Heat exchanger design methodology, assumption for heat transfer analysis, problem formulation, e-NTU method, *P*-NTU method, Mean temperature difference method, fouling of heat exchanger, effects of fouling, categories of fouling, fundamental processes of fouling.

Unit 2

Double Pipe Heat Exchangers: Thermal and Hydraulic design of inner tube, Thermal and hydraulic analysis of Annulus, Total pressure drop

Unit 3

Compact Heat Exchangers: Thermal and Hydraulic design of compact heat exchanger

Unit 4

Shell and Tube heat exchangers – Tinker's, kern's, and Bell Delaware's methods, for thermal and hydraulic design of Shell and Tube heat exchangers

Unit 5

Mechanical Design of Heat Exchangers – design standards and codes, key terms in heat exchanger design, material selection, and thickness calculation for major components such as tube sheet, shell, tubes, flanges and nozzles. Introduction to simulation and optimization of heat exchangers, flow induced vibrations.

References:

1. Ramesh K. Shah and Dusan P. Sekulic, "Fundamentals of Heat Exchanger Design" John Wiley & sons Inc., 2003.
2. D.C. Kern, "Process Heat Transfer", McGraw Hill, 1950.
3. Sadik Kakac and Hongton Liu, "Heat Exchangers: Selection, Rating and Thermal Design" CRC Press, 1998.
4. A .P. Frass and M.N. Ozisik, "Heat Exchanger Design", McGraw Hill, 1984
5. Afgan N. and Schlinder E.V. "Heat Exchanger Design and Theory Source Book".
6. T. Kuppan, "Hand Book of Heat Exchanger Design".
7. "T.E.M.A. Standard", New York, 1999.
8. G. Walkers, "Industrial Heat Exchangers-A Basic Guide", McGraw Hill, 1982.