22MEPE15	ENERGY CONVERSION IN INDUSTRIES		SEMESTER VI			
PREREQUISITES		**CATEGORY**	**L**	**T**	**P**	**C**
1.Thermal Engineering		**PE**	**3**	**0**	**0**	**3**
2.Thermal storage system						

COURSE OBJECTIVES:

1.	Analyzing the thermodynamic cycles used in power generation
2.	Evaluating the merits of direct thermal energy conversion systems compared to conventional techniques
3.	Analyzing the performance of fuel cells
4.	Selecting the best energy storage mechanism for any given application
5.	Developing a mechanism for total energy recovery from a system adopting CHCP concept

UNIT I	ENERGY CONVERSION CYCLES	9	0	0	9

Bell Coleman, Scuderi, Stirling, Ericsson, Lenoir, Atkinson, Stoddard and Kalina cycle – Comparison with Rankine and Brayton cycles.

UNIT II	DIRECT CONVERSION OF THERMAL TO ELECTRICAL ENERGY	9	0	0	9

MHD - Thermoelectric Converters – Thermoelectric refrigerator – Thermoelectric Generator – Thermionic converters – Ferro electric converter – Nernst Effect Generator – Thermo Magnetic Converter

UNIT III	DIRECT CONVERSION OF CHEMICAL TO ELECTRICAL ENERGY	9	0	0	9

Fuel Cell : Basics – working advantages and drawbacks – types – comparative analysis – thermodynamics and kinetics of fuel cell process – performance of fuel cell – applications

UNIT IV	ENERGY STORAGE SYSTEMS	9	0	0	9

Batteries – types – working – performance governing parameters – hydrogen energy – solar cells. Energy storage devices for Mechanical Energy, Electrical Energy, Chemical Energy, Thermal Energy.

UNIT V	COMBINED HEAT, COOLING AND POWER PRODUCTION (CHCP)	9	0	0	9

Cogeneration - types - Configuration and thermodynamic performance of steam turbine cogeneration systems – gas turbine cogeneration systems – reciprocating IC engines cogeneration systems – concept of Polygeneration

Total (45L): 45 Periods

TEXT BOOKS:

1.	Archie.W.Culp, Principles of Energy Conversion, 2 ndEdition, McGraw-Hill Inc., 1991, New York
2.	Kordesch Karl, and Günter R. Simader, Fuel Cell and Their Applications, Wiley 2006

REFERENCES:

1	Bent Sorensen, Renewable Energy Conversion, Transmission, and Storage Technology & Engineering, Academic Press, 2007.
2	Charles R. Russell, Elements of Energy Conversion, Permagon Press, 1967
3	Hart A.B. and Womack, G.J., Fuel Cells: Theory and Application, Prentice Hall, 1989
4	Kettari, M.A., Direct Energy Conversion, Addison-Wesley, 1997
5	Yogi Goswami, D. and Frank Kreith, Energy Conversion, Second Edition, Science, 2017.

E-REFERENCES:

1.	https://energyeducation.ca/encyclopedia/Energy_conversion_technology
2.	https://ioe.iitm.ac.in/program/energy-systems/

3.	https://www.industrytap.com/industrial-energy-conversion-transfer-efficiencies-trending/39616

COURSE OUTCOMES: **Upon completion of this course, the students will be able to:**		**Bloom Taxonomy Mapped**
CO1	Analyze the thermodynamic cycles used in power generation	Analyze
CO2	Evaluate the merits of direct thermal energy conversion systems compared to conventional techniques	Apply
CO3	Analyze the performance of fuel cells	Analyze
CO4	Select the best energy storage mechanism for any given application	Understand
CO5	Develop a mechanism for total energy recovery from a system adopting CHCP concept	Understand

COURSE ARTICULATION MATRIX

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	1	1	0	1	0	0	0	0	0	2	1	1
CO2	3	2	2	1	1	1	0	0	0	0	0	0	2	1	1
CO3	3	3	3	1	1	1	1	0	0	0	0	0	2	1	1
CO4	2	2	3	1	1	1	1	0	0	0	0	0	2	1	1
CO5	2	2	2	2	1	1	1	0	0	0	0	0	2	1	1
Avg	**2.6**	**2.2**	**2.4**	**1.2**	**1.0**	**0.8**	**0.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**2**	**1**	**1**
3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)															