SHRI VENKATESHWARA UNIVERSITY

Syllabus

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

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	WTE- 051	Design of Solar and Wind System	3	1	0	20	10	30		70		100	4
2	WOE-555 -	Composite Materials	3	0	0	20	10	30		70		100	3
3	MTE- 521	Dissertation Phase – I			20				125		125	250	10
		Total										450	17

WTE-051 Design of Solar and Wind Systems

Course Outcomes:

At the end of the course:

1. Student should update about the technological status of implementation of NCES in India
2. Student should capable to analyze various techno economical obstacles in the commercial development of NCES in India
3. Student should capable to conceptually model and design general NCES systems and predict the long term performance.
4. Student should suggest and plan hybrid NCES solutions to conventional energy systems

Syllabus Contents: **L T P**
                                                                               3 - -

Unit 1
Conventional sources of energy, Nuclear, Alternative energy sources,

Unit 2
Solar Radiation-estimation, prediction & measurement, Solar energy utilization,

Unit 3
Performance of Solar flat plate collectors, concentrating collectors, thermal storage,

Unit 4
Wind energy, Direct Energy conversion- PV, MHD, Fuel cells, thermionic, thermoelectric, Biomass, biogas, hydrogen, Geothermal.

References:

1. D.Y. Goswami, F. Kreith and J.F. Kreider, "Principle of Solar Engineering", Taylor and Francis, 2000.
2. Sukhatme S.P., "Solar Energy", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1994.
3. Bansal and othes, "Non-Conventional Energy Sources".
4. J.F. Kreider, F. Kreith, "Solar Energy Handbook", McGraw Hill, 1981
5. J.A. Duffie and W.A. Beckman, "Solar Engineering of Thermal Processes", John Wiley, 1991.

MOE-555 Composite Materials

Course Outcomes: At the end of the course, the student should be able to
1. Students should able to apply the dynamic programming to solve problems of discreet and continuous variables. 2. Students should able to apply the concept of non-linear programming 3. Students should able to carry out sensitivity analysis 4. Student should able to model the real world problem and simulate it.
Syllabus Contents: **L T P** 3 - - **Unit 1** Introduction,Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance. **Unit 2** Reinforcements Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions. **Unit 3** Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications. **Unit 4** Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications. **Unit 5**

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight

strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

References:

1. Hand Book of Composite Materials-ed-Lubin.

2. Composite Materials – K.K.Chawla.

3. Composite Materials Science and Applications – Deborah D.L. Chung.

4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

5. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.

6. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by

R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.