SHRI VENKATESHWARA UNIVERSITY

EVALUATION SCHEME & SYLLABUS

M.TECH Power System

(Two Years Post Graduation Programme)
III SEMESTER

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

			M.TECH Power System SEMESTER-III										
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	MPS-052	FACTS and Custom Power Devices	3	0	0	20	10	30		70		100	3
2	MOE-335	Composite Materials	3	0	0	20	10	30		70		100	3
3	MPS-321	Dissertation Phase-I	0	0	20				125		125	250	10
		Total										450	16

Code	Course Name	L-T-P	Cr.
WPS -052	FACTS and Custom Power Devices	3-0-0	3

Course Objectives:-Students will be able to:
- To learn the active and reactive power flow control in power system
- To understand the need for static compensators
- To develop the different control strategies used for compensation

Unit No.	Content
1	Reactive power flow control in Power Systems . Control of dynamic power unbalances in Power System - Power flow control. Constraints of maximum transmission line loading. Benefits of FACTS Transmission line compensation. Uncompensated line -Shunt compensation, Series compensation Phaseangle control. Reactive power compensation Shunt and Series compensation principles. Reactive compensation at transmission and distribution level.
2	Static versus passive VAR compensator, Static shunt compensators: SVC and STATCOM. Operation and control of TSC, TCR and STATCOM –Compensator Control.Comparison between SVC and STATCOM.
3	Static series compensation: TSSC, SSSC -Static voltage and phase angle regulators TCVR and TCPAR Operation and Control. Applications, Static series compensation. GCSC, TSSC, TCSC and Static synchronous series compensators and their Control.
4	SSR and its damping Unified Power Flow Controller. Circuit Arrangement, Operation and control of UPFC. Basic Principle of P and Q control. Independent real and reactive power flow control- Applications

5	Introduction to interline power flow controller. Modeling and analysis of FACTS Controllers Simulation of FACTS controllers Power quality problems in distribution systems, harmonics, loads that create harmonics modeling, harmonic propagation, series and parallel resonances mitigation of harmonics passive filters, active filtering – shunt , series and hybrid and their control,
6	Voltage swells , sags, flicker, unbalance and mitigation of these problems by power line conditioners IEEE standards on power quality.

Suggested reading

- K R Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age InternationalPublishers, 2007.

- X P Zhang, C Rehtanz, B Pal, "Flexible AC Transmission Systems- Modelling and Control",

- N.G. Hingorani, L. Gyugyi, "Understanding FACTS: Concepts and Technology of

- Flexible ACTransmission Systems", IEEE Press Book, Standard Publishers and Distributors, Delhi, 2001.

- K.S.Sureshkumar ,S.Ashok , "FACTS Controllers & Applications", E-book edition, Nalanda DigitalLibrary, NIT Calicut,2003.

- G T Heydt , "Power Quality", McGraw-Hill Professional, 2007

- T J E Miller, "Static Reactive Power Compensation", John Wiley and Sons, New York, 1982.

Course Outcomes: Students will be able to:

- Acquire knowledge about the fundamental principles of Passive and Active Reactive.

- Power Compensation Schemes at Transmission and Distribution level in Power Systems.

- Learn various Static VAR Compensation Schemes like Thyristor /GTO Controlled Reactive Power Systems, PWM_ Inverter based Reactive Power Systems and their controls.

- To develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems.

Code	Course Name	L-T-P	Cr.
WOP-034	Composite Materials	3-0-0	3

Syllabus & Content:

Unit No.	Content
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.
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.
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.
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.
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.

TEXT BOOKS:

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

- Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

<u>References:</u>

- Hand Book of Composite Materials-ed-Lubin.
- Composite Materials – K.K.Chawla.
- Composite Materials Science and Applications – Deborah D.L. Chung.
- Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.