**VELTECH MULTI TECH Dr. RANGARAJAN Dr. SAKUNTHALA ENGINEERING COLLEGE**

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Approved by AICTE, New Delhi NBA Accredited & Affiliated to Anna University Chennai-25

# SYLLABUS

# WEEKLY SCHEDULE

**SEMESTER VIII** **2014- 2015**

## DEPARTMENT OF EEE

**4 YEAR COURSE**

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**VELTECH MULTITECH Dr.RANGARAJAN Dr.SAKUNTHALA ENGG. COLLEGE**

**DEPARTMENT OF EEE**

**WEEKLY SCHEDULE**

**SEM : VIII YEAR : IV**

**ACADEMIC YEAR: 2014– 2015**

| S.No | WEEKS | DATE | |
|---|---|---|---|
| | | FROM | TO |
| 1 | WEEK1 | 02.01.15 | 09.01.15 |
| 2 | WEEK2 | 12.01.15 | 16.01.15 |
| 3 | WEEK3 | 19.01.15 | 23.01.15 |
| 4 | WEEK4 | 27.01.15 | 30.01.15 |
| 5 | WEEK5 | 02.02.15 | 06.02.15 |
| 6 | WEEK6 | 09.02.15 | 13.02.15 |
| 7 | WEEK7 | 16.02.15 | 20.02.15 |
| 8 | WEEK8 | 23.02.15 | 27.02.15 |
| 9 | WEEK9 | 02.03.15 | 06.03.15 |
| 10 | WEEK10 | 09.03.15 | 13.03.15 |
| 11 | WEEK11 | 16.03.15 | 20.03.15 |
| 12 | WEEK12 | 23.03.15 | 27.03.15 |
| 13 | WEEK13 | 30.03.15 | 01.04.15 |
| 14 | WEEK14 | 06.04.15 | 10.04.15 |
| 15 | WEEK15 | 13.04.15 | 17.04.15 |
| 16 | WEEK16 | 20.04.15 | 24.04.15 |
| 17 | WEEK17 | 27.04.15 | 30.04.15 |

## CONTENTS

### THEORY



### PRACTICAL

# TEST SCHEDULE

| SL.NO | SUBJECT CODE | SUBJECT NAME | UNIT TEST I | UNIT TEST II | UNIT TEST III | UNIT TEST IV | UNIT TEST V |
|---|---|---|---|---|---|---|---|
| 1 | EE 2451 | ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION | 22.01.15 FN | 11.02.15 FN | 03.03.15 FN | 23.03.15 FN | 13.04.15 FN |
| 2 | EE 2028 | POWER QUALITY | 22.01.15 AN | 11.02.15 AN | 03.03.15 AN | 23.03.15 AN | 13.04.15 AN |
| 3 | EE 2036 | FLEXIBLE AC TRANSMISSION SYSTEMS | 23.01.15 FN | 12.02.15 FN | 04.03.15 FN | 24.03.15 FN | 15.04.15 FN |

## MODEL THEORY

| Sl. NO | DATE | SUB.CODE | SUBJECT |
|---|---|---|---|
| 1 | 20.04.2015 | EE 2451 | ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION |
| 2 | 21.04.2015 | EE 2028 | POWER QUALITY |
| 3 | 22.04.2015 | EE 2036 | FLEXIBLE AC TRANSMISSION SYSTEMS |

**EE2451 ELECTRIC ENERGY GENERATION UTILISATION AND CONSERVATION**

**UNIT I POWER GENERATION**

WEEK 1: Review of conventional methods – thermal, hydro and nuclear based power generation. Non-conventional methods of power generation – fuel cells - tidal waves.

WEEK 2: Wind – geothermal – solar - bio-mass - municipal waste.

WEEK 3: Cogeneration. Effect of distributed generation on power system operation.
UNIT TEST-I

**UNIT II ECONOMIC ASPECTS OF GENERATION**

WEEK 4:Economic aspects of power generation – load and load duration curves. number and size of units – cost of electrical energy

WEEK 5: tariff. Economics of power factor improvement – power capacitors – power quality.

WEEK 6: Importance of electrical energy conservation – methods – energy efficient equipments. Introduction to energy auditing.
UNIT TEST-II

**UNIT III ILLUMINATION**

WEEK 7: Importance of lighting – properties of good lighting scheme

WEEK 8:laws of illumination – photometry - types of lamps – lighting calculations

WEEK 9: basic design of illumination schemes for residential, commercial, street lighting, and sports ground – energy efficiency lamps.
UNIT TEST-III

**UNIT IV INDUSTRIAL HEATING AND WELDING**

WEEK 10: Role electric heating for industrial applications – resistance heating – induction heating

WEEK 11: dielectric heating - electric arc furnaces.

WEEK 12: Brief introduction to electric welding, welding generator, welding transformer and the characteristics
UNIT TEST-IV

**UNIT V ELECTRIC TRACTION**

WEEK 13: Merits of electric traction – requirements of electric traction system – supply systems

WEEK 14: mechanics of train movement – traction motors and control

WEEK 15:braking recent trends in electric traction.

UNIT TEST-V

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

**TEXT BOOKS**

1. C.L. Wadhwa, 'Generation, Distribution and Utilization of Electrical Energy', New Age International Pvt. Ltd, 2003.

2. B.R. Gupta, 'Generation of Electrical Energy', Eurasia Publishing House (P) Ltd, New Delhi, 2003.

**REFERENCES**

1. H. Partab, 'Art and Science of Utilisation of Electrical Energy', Dhanpat Rai and Co, New Delhi, 2004.

2. E. Openshaw Taylor, 'Utilization of Electrical Energy in SI Units', Orient Longman Pvt. Ltd, 2003.

3. J.B. Gupta, 'Utilization of Electric Power and Electric Traction', S.K.Kataria and Sons, 2002.

**EE2028 POWER QUALITY**

**UNIT I INTRODUCTION TO POWER QUALITY**

WEEK 1: Terms and definitions: Overloading - under voltage - over voltage. Concepts of transients - short duration variations such as interruption - long duration variation such as sustained interruption.

WEEK 2: Sags and swells - voltage sag - voltage swell – voltage imbalance - voltage fluctuation - power frequency variations.

WEEK 3: International standards of power quality. Computer Business Equipment Manufacturers Associations (CBEMA) curve.
UNIT TEST-I

**UNIT II VOLTAGE SAGS AND INTERRUPTIONS**

WEEK 4:Sources of sags and interruptions - estimating voltage sag performance.

Thevenin's equivalent source - analysis and calculation of various faulted condition

WEEK 5: Voltage sag due to induction motor starting. Estimation of the sag severity

WEEK 6: mitigation of voltage sags, active series compensators. Static transfer switches and fast transfer switches.
UNIT TEST-II

**UNIT III OVER VOLTAGES**

WEEK 7: Sources of over voltages - Capacitor switching

WEEK 8: – lightning - ferro resonance. Mitigation of voltage swells - surge arresters - low pass filters- power conditioners.

WEEK 9: Lightning protection – shielding - line arresters - protection of transformers and cables. An introduction to computer analysis tools for transients, PSCAD and EMTP

UNIT TEST-III

**UNIT IV HARMONICS**

WEEK 10: Harmonic sources from commercial and industrial loads, locating harmonic sources Power system response characteristics - Harmonics Vs transients..

WEEK 11: Effect of harmonics - harmonic distortion - voltage and current distortion - harmonic indices - inter harmonics – resonance.

WEEK 12: Harmonic distortion evaluation - devices for controlling harmonic distortion - passive and active filters. IEEE and IEC standards.
UNIT TEST-IV

**UNIT V POWER QUALITY MONITORING**

WEEK 13: Monitoring considerations - monitoring and diagnostic techniques for various power quality problems

WEEK 14: modeling of power quality (harmonics and voltage sag) problems by mathematical simulation tools - power line disturbance analyzer Quality measurement equipment

WEEK 15: harmonic / spectrum analyzer - flicker meters - disturbance analyzer. Applications of

expert systems for power quality monitoring. Recent trends in electric traction.

UNIT TEST-V

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

**TEXT BOOKS**

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty,

'Electrical Power Systems Quality' McGraw Hill,2003.(For Chapters1,2,3, 4 and 5)

**REFERENCES**

1. G.T. Heydt, 'Electric Power Quality', 2nd Edition. (West Lafayette, IN, Stars in a

Circle Publications, 1994). (For Chapter 1, 2, 3 and 5)

2. M.H.J Bollen, 'Understanding Power Quality Problems: Voltage Sags and

Interruptions', (New York: IEEE Press, 1999). (For Chapters 1, 2, 3 and 5)

3. J. Arrillaga, N.R. Watson, S. Chen, 'Power System Quality Assessment', (New

York: Wiley, 1999). (For Chapters 1, 2, 3, 4 and 5)

4. PSCAD User Manual

**EE2036 FLEXIBLE AC TRANSMISSION SYSTEMS**

**UNIT I INTRODUCTION**

WEEK 1: The concept of flexible AC transmission - reactive power control in electrical power Transmission lines -uncompensated transmission line – series and shunt compensation.

Overview of FACTS devices

WEEK 2: Static Var Compensator (SVC) – Thyristor Switched
Series capacitor (TCSC)
WEEK3: Unified Power Flow controller (UPFC) - Integrated Power Flow Controller (IPFC).
UNIT TEST-I

**UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS**

WEEK 4: Voltage control by SVC – advantages of slope in dynamic characteristics
WEEK 5: influence of SVC on system voltage. Applications
WEEK 6: enhancement of transient stability – steady state power transfer.enhancement of power system damping – prevention of voltage instability.
UNIT TEST-II

**UNIT III THYRISTOR CONTROLLED SERIES CAPACITOR(TCSC) AND**

**APPLICATIONS**

WEEK 7: Operation of the TCSC - different modes of operation

WEEK 8: modeling of TCSC – variable reactance model – modeling for stability studies
WEEK 9: Applications - improvement of the system stability limit – enhancement of system damping – voltage collapse prevention
UNIT TEST-III

**UNIT IV EMERGING FACTS CONTROLLERS**

WEEK 10: Static Synchronous Compensator (STATCOM) – operating principle
WEEK 11: V-I characteristics– Unified Power Flow Controller (UPFC).

WEEK 12: Principle of operation modes of operation –applications – modeling of UPFC for power flow studies.
UNIT TEST-IV

**UNIT V CO-ORDINATION OF FACTS CONTROLLERS**

WEEK 13: FACTs Controller interactions.SVC–SVC interaction
WEEK 14: co-ordination of multiple controllers using linear control techniques

WEEK 15: Quantitative treatment of control coordination.

UNIT TEST-V

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

**TEXT BOOKS**

1. Mohan Mathur, R., Rajiv. K. Varma, “Thyristor – Based Facts Controllers for Electrical Transmission Systems”, IEEE press and John Wiley & Sons, Inc.

**REFERENCES:**

1. A.T.John, “Flexible AC Transmission System”, Institution of Electrical and Electronic Engineers (IEEE), 1999.
2. Narain G.Hingorani, Laszio. Gyugyl, “Understanding FACTS Concepts and Technology of Flexible AC Transmission System”, Standard Publishers, Delhi 2001.3. J.B. Gupta, ‘Utilization of Electric Power and Electric Traction’, S.K.Kataria and Sons, 2002.