**MORADABAD INSTITUTE OF TECHNOLOGY**

DEPARTMENT OF ELECTRICAL ENGINEERING

LECTURE SCHEDULE (BLOW UP)

Subject: Introduction to Power Quality and FACTS Subject Code: REE-081

Branch: EE Semester: 8TH  Section: H+I Sessional Marks: 100

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| **Sr. No.** | **Topic** | **No. of Lecture Required** | **Remark** |
|  | **Unit-I Introduction to Power Quality** |  |  |
| 1 | Terms and definitions of transients,  | 1 |  |
| 2 | Long duration Voltage Variations: under Voltage, Under Voltage and Sustained Interruptions; | 2 |  |
| 3 | Short Duration Voltage Variations: interruption, Sag, Swell;  | 2 |  |
| 4 | Voltage Imbalance; Notching D C offset, | 1 |  |
| 5 | Waveform distortion; voltage fluctuation; power frequency variations. | 2 |  |
|  | **Unit-II Voltage Sag** |  |  |
| 6 | Sources of voltage sag: motor starting, arc furnace, fault clearing etc. | 2 |  |
| 7 | Estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer; | 2 |  |
| 8 | Voltage Regulator | 1 |  |
| 9 | Static UPS, Rotary UPS, and Active Series Compensator. | 2 |  |
|  | **Unit-III Electrical Transients** |  |  |
| 10 | Sources of Transient Over voltages- Atmospheric and switching transients- motor starting transients | 2 |  |
| 11 | PF correction capacitor switching transients, neutral voltage swing etc.;  | 2 |  |
| 12 | Devices for over voltage protection. | 1 |  |
| 13 | Switching transients, | 1 |  |
|  | **Unit-IV FACT System** |  |  |
| 14 | Introduction – Terms &Definition, | 1 |  |
| 15 | Fact Controllers, | 1 |  |
| 16 | Type of FACT devices i.e. SSC, SVC,  | 1 |  |
| 17 | TSC, SSS, | 1 |  |
| 18 | TCSC. | 1 |  |
| 19 | UPFC Basic relationship for power flow control. | 2 |  |
|  | **Unit-V Harmonics** |  |  |
| 20 | Causes of harmonics; | 1 |  |
| 21 | Current and voltage harmonics: | 1 |  |
| 22 | Measurement of harmonics; | 1 |  |
| 23 | Effects of harmonics on – Transformers, AC Motors, Capacitor Banks, Cables, and Protection Devices, Energy Metering, Communication Lines etc., | 2 |  |
| 24 | Harmonic Mitigation Techniques. | 2 |  |

Text Books:

1. Roger C Dugan, McGrahan, Santoso&Beaty, “Electrical Power System Quality” McGraw Hill

2. Arinthom Ghosh & Gerard Ledwich, “Power Quality Enhancement Using Custom Power Devices”

Kluwer Academic Publishers

3. C. Sankaran, “Power Quality” CRC Press

4. S. Sivanagaraju& S. Satyanarayana, “Electric Power Transmission and Distribution” Pearson

Education

5. Narain G. Hingorani& Laszlo Gyugyi “Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems” Wiley

Subject Teacher: - Mr. Ram Singh Head of the Department: - Dr. Rajul Mishra