

**EE 238 – Power Engineering - II [S2-DD]**  
*Spring Semester, 2024-25*

**Instructors:**

- **S. Anand**, Office: Ground Floor-EE, Tel: 7409 **Email:** [sa@ee.iitb.ac.in](mailto:sa@ee.iitb.ac.in)

**TAs:**

| Roll No. /email  | Name                           | Role   |
|--|--------------------------------|--|
| <a href="mailto:19D070042@iitb.ac.in">19D070042@iitb.ac.in</a> | Panyam Sweeya Goud             | Attendance                                       |
| <a href="mailto:214076005@iitb.ac.in">214076005@iitb.ac.in</a> | Saurabh Singh                  | Slides – PS part                                 |
| <a href="mailto:214070011@iitb.ac.in">214070011@iitb.ac.in</a> | Akash Gangwar                  | Slides – PS part                                 |
| <a href="mailto:24D0516@iitb.ac.in">24D0516@iitb.ac.in</a>     | Shakir Shumoil Hussain Pandit  | Assignments (PE part)                            |
| <a href="mailto:23M1103@iitb.ac.in">23M1103@iitb.ac.in</a>     | Nikhil Lekhra                  | Corresponding TA, Main Quiz Coordination, Moodle |
| <a href="mailto:24M1105@iitb.ac.in">24M1105@iitb.ac.in</a>     | Ankit Gupta                    | Assignments (PE & PS part)                       |
| <a href="mailto:24M1104@iitb.ac.in">24M1104@iitb.ac.in</a>     | Ankurbhai Maheshbhai Talsaniya | Assignments (PS part)                            |
|  |                                | All for quiz / exam coordination                 |

**Lecture Slot:** 6A - Wed – venue **LC-301** - 11:05 - 12:30  
6B - Fri – venue **LC-301** - 11:05 – 12:30

**Quizzes:**

| Quiz No. | Date (Friday) | Time        |
|----------|---------------|-------------|
| 1        | 24 Jan        | 11:30-12:30 |
| 2        | 14 Feb        | 11:30-12:30 |
| 3        | 21 March      | 11:30-12:30 |
| 4        | 11 April      | 11:30-12:30 |

**Distribution of Marks:**

Quizzes → 30 % (best 3 out of 4 quizzes)  
Mid Sem. → 25 %  
End Sem. → 40 %  
Attendance → 5 % (student attendance  $\geq 70\%$  gets 3/5;  $\geq 90\%$  gets 5/5; 70% gets 0/5)  
Total → 100 %

**Reference Books:**

1. Power Electronics: Circuits, Devices and Applications - Mohammad Rashid
2. Power Electronics: Converter applications and Design - Ned Mohan, Tore Undeland and William P Robins
3. Electric Energy System Theory: An Introduction - Ollie I. Elgerd

4. Electric Power Systems - B. M. Weedy, B. J. Cory, N. Jenkins, J. B. Eknayake and G.Strbac

**Syllabus (Tentative):**

- Power Electronics
  - Motivation and Introduction to power electronic converters
  - DC-DC converters: buck, boost and buck-boost converters
    - Circuit operation, waveforms, steady state analysis, ripple
    - Conditions for DCM
  - Flyback converter
    - Circuit operation, waveforms, steady state analysis, ripple
  - Overview of other topologies: Forward converter etc.
  - Single phase voltage sources inverter / h-bridge
    - Operation, modulation / sine-PWM
  - Three phase voltage source inverters
    - As extension of single phase.
  - Examples of power electronics and controls in Motor Drives:
    - V/F control of Induction Motor using VSI
    - Speed control of DC Motor using dc-dc converter
    - Current control in BLDC motor using VSI
- Power Systems
  - Structure of power grids
    - Generation, transmission, and distribution
  - Generation
    - Synchronous machines: basics operation, equivalent circuit
    - Single generator, single load system
      - Voltage and speed control
    - Multiple generator system – droop control
    - Power angle curve for single machine infinite bus
    - Inverter based generation – wind and solar
  - Transmission
    - AC HV: transmission line and cable characteristics, reactive power compensation
    - HVDC systems
  - Distribution
    - 3-phase Transformers and OLTC
    - Power quality
    - Load characteristics

**Note / Instructions:**

1. Attendance is mandatory. DX grade rules may be followed as per institute guidelines.

2. Assignments will be given during the course. No solutions will be provided. Only answers. Assignments will not be evaluated. It is for your own practise and understanding.
3. Notes / books / printouts / Electronic medium / laptops / mobile / google / e-books / videos etc. are strictly not allowed during quizzes and exams.
4. **Quiz will be conducted as per the schedule.** Always show the steps of solution. No marks would be given if answer is provided without justified steps.
5. **No make-up and pro rata** would be considered for the **quizzes** missed.
6. Pro rata (or make-up, based on instructor) for missed mid-sem or end-sem only in case of medical emergency, with approval from instructor.
7. Get your doubts clarified in the lectures. In case any doubt is not clarified during interaction session due to time constraint, you may email the instructor and fix a mutually agreeable time for meeting / discussion. Avoid requesting for meeting / discussions just before mid-sem and end-sem exams.
8. We will use moodle for sharing assignments, announcements, marks etc.