Department of Electronics and Telecommunication Engineering
K. K. Wagh Institute of Engineering Education and Research
HirabaiHaridasVidyanagari, AmrutDham, Panchavati, Nashik-422003

# Innovative Teaching – Learning Activities

## Active & Experimental Learning

### VTFR Test (Variable Time Fixed Result)

### Class: TY Btech

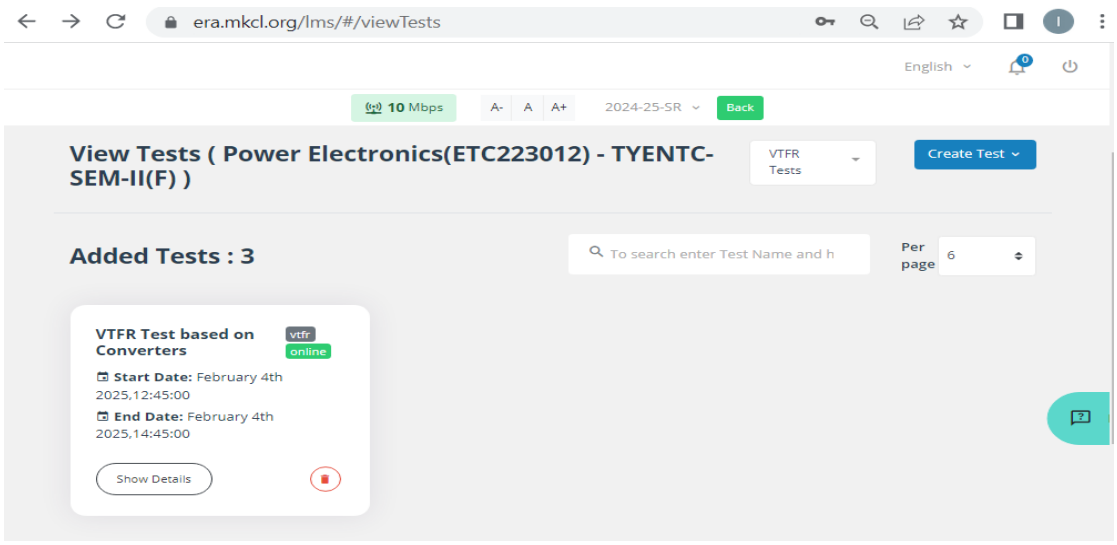
### Course: Power Electronics

**Objective:** The VTFR test is designed to enhance students' problem-solving abilities by encouraging them to master a specific topic through repeated attempts. The test ensures that students engage with challenging numerical problems, review concepts through instructional videos, and apply their understanding until they achieve success. The goal is to strengthen their conceptual clarity and prepare them for future exams.

### Outcomes:

1. **Better Understanding:** Students learn concepts deeply by solving problems multiple times.
2. **Self-Learning Habit:** Watching videos and retrying problems helps them study independently.
3. **Stronger Problem-Solving Skills:** They learn to tackle tough problems with confidence.
4. **Exam Readiness:** Practicing similar questions prepares them for future tests.

### Photo for Activity:



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## Report of Analysis

| Class Strength | No. of Students who | | | | | | |
|---|---|---|---|---|---|---|---|
| | Completed in | | | | | | |
| | Appeared for VTFR test | First attempt | Second attempt | Third attempt | Fourth Attempt | Fifth Attempt | Could not solve |
| Div A - | 74 | 54 | 13 | 02 | 02 | 00 | 03 |
| Div B - | 72 | 58 | 08 | 03 | 01 | 00 | 02 |

**Impact of the activity:**

1. **Higher Exam Scores:** Students improve by mastering concepts in their Insem exam 2024-25.
2. **Solid Foundation:** They build strong basics for advanced topics.
3. **Active Learning:** Engaging with problems keeps them focused.
4. **Logical Thinking:** They develop analytical and problem-solving skills.
5. **Confidence Boost:** Solving problems repeatedly makes them more confident

# Analysis for the Insem result for AY 2023-24 and 2024-25

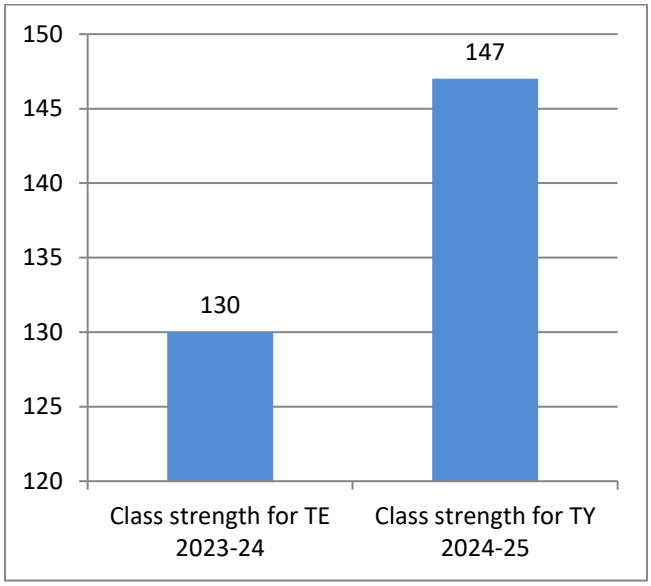



**Figure1: Class Strength**

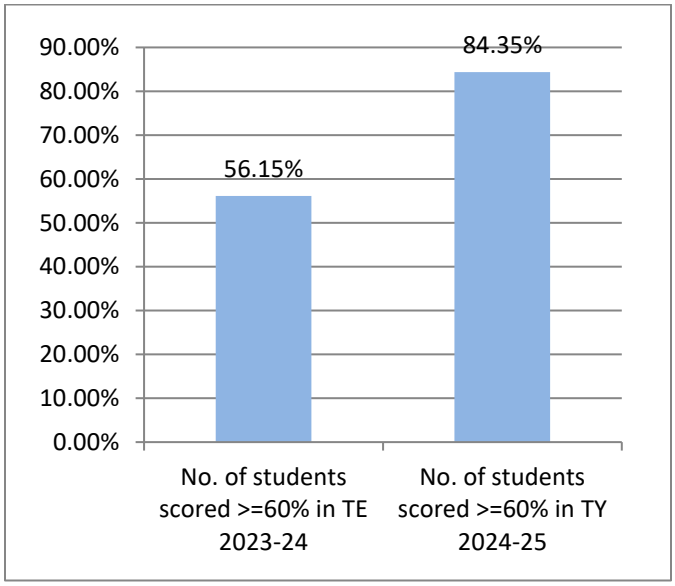
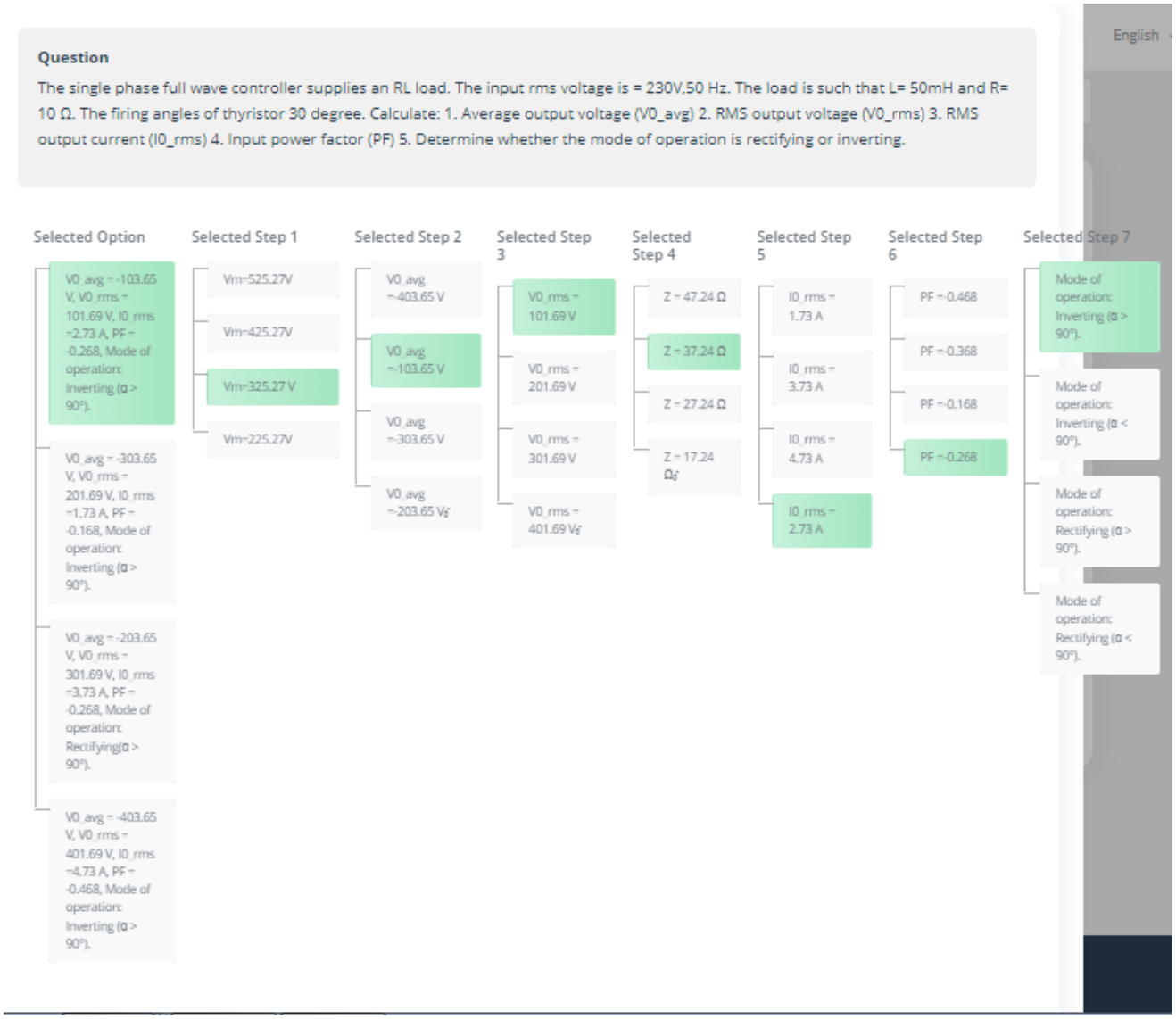



**Figure2: Insem Exam Result**

# VTFR Problem on Single Phase AC to DC converter



# VTFR Problems on (Full-Wave Bridge Converter Numerical Problems (RL Load))

Subject Name: Power Electronics

Teacher's Name: Dr. D. M. Chandwadkar, Prof. I. M. Sayyed

Department :E&TC

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# Problem Statement (Problem 1)

- The single phase full wave controller supplies an RL load. The input rms voltage is = 230V, 50 Hz. The load is such that L= 100mH and R= 20 Ω. The firing angles of thyristor is 120 degree.
  Calculate:
  1. Average output voltage (Vo_avg)
  2. RMS output voltage (Vo_rms)
  3. RMS output current (Io_rms)
  4. Input power factor (PF)
  5. Determine whether the mode of operation is rectifying or inverting.

# Options for Final Solution of Problem 1
# (Mark correct option by blue text color)

Option 1 :Vo_avg = -103.65 V, Vo_rms = 101.69 V, Io_rms =2.73 A, PF = -0.268, Mode of operation: Inverting (α > 90°).

Option 2: Vo_avg = -303.65 V, Vo_rms = 201.69 V, Io_rms =1.73 A, PF = -0.168, Mode of operation: Inverting (α > 90°).

Option 3: Vo_avg = -203.65 V, Vo_rms = 301.69 V, Io_rms =3.73 A, PF = -0.268, Mode of operation: Rectifying(α > 90°).

Option 4: Vo_avg = -403.65 V, Vo_rms = 401.69 V, Io_rms =4.73 A, PF = -0.468, Mode of operation: Inverting (α > 90°).

# Options for Step 1
# (Mark correct option by blue text color)

Option 1 :Vm=525.27V

Option 2:Vm=425.27V

Option 3:Vm=325.27 V

Option 4:Vm=225.27V

# Options for Step 2
# (Mark correct option by blue text color)

Option 1 :Vo_avg =-403.65 V

Option 2:Vo_avg =-103.65 V

Option 3:Vo_avg =-303.65 V

Option 4:Vo_avg =-203.65 V

# Options for Step 3
# (Mark correct option by blue text color)

Option 1 :Vo_rms = 101.69 V

Option 2:Vo_rms = 201.69 V

Option 3:Vo_rms = 301.69 V

Option 4:Vo_rms = 401.69 V

# Options for Step 4
# (Mark correct option by blue text color)

Option 1 : . Z = 47.24 Ω

Option 2: . Z = 37.24 Ω

Option 3: . Z = 27.24 Ω

Option 4: . Z = 17.24 Ω

# Options for Step 5
# (Mark correct option by blue text color)

Option 1 : Io_rms = 1.73 A

Option 2: Io_rms = 3.73 A

Option 3: Io_rms = 4.73 A

Option 4: Io_rms = 2.73 A

# Options for Step 6
# (Mark correct option by blue text color)

Option 1 :PF =-0.468

Option 2:PF =-0.368

Option 3:PF =-0.168

Option 4:PF =-0.268

# Options for Step 7
# (Mark correct option by blue text color)

Option 1 :Mode of operation: Inverting ($\alpha > 90°$).

Option 2:Mode of operation: Inverting ($\alpha < 90°$).

Option 3:Mode of operation: Rectifying ($\alpha > 90°$).

Option 4:Mode of operation: Rectifying ($\alpha < 90°$).