

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

M.Tech I Year II Semester Regular Examinations August-2026

FACTS CONTROLLERS

(Power Electronics)

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

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|---|---|--|-----|----|----|
| 1 | a | Give detailed technical comparison between Voltage Source Converters (VSC) and Current Source Converters (CSC). Discuss why VSC is preferred for most modern FACTS applications. | CO1 | L2 | 6M |
| | b | Explain the operation of a 12-pulse converter with a neat circuit diagram. | CO1 | L2 | 6M |

OR

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|---|---|---|-----|----|----|
| 2 | a | Explain power flow in an interconnected AC transmission system. | CO1 | L2 | 6M |
| | b | Discuss the working principle and applications of different types of FACTS controllers. | CO1 | L2 | 6M |

UNIT-II

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|---|--|--|-----|----|-----|
| 3 | | Describe the operation of a Thyristor Controlled Reactor (TCR) and derive the expression for its effective inductance. | CO2 | L3 | 12M |
|---|--|--|-----|----|-----|

OR

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|---|--|--|-----|----|-----|
| 4 | | Detail the architecture and advantages of Hybrid Var Generators in modern grids. | CO3 | L2 | 12M |
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UNIT-III

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|---|--|---|-----|----|-----|
| 5 | | Explain the basic objectives of series compensation. How does it differ from shunt compensation in terms of power transfer enhancement? | CO3 | L3 | 12M |
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OR

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|---|--|--|-----|----|-----|
| 6 | | Analyze the phenomenon of Sub-Synchronous Resonance (SSR) and explain how TCSC can help in its mitigation. | CO3 | L3 | 12M |
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UNIT-IV

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|---|--|--|-----|----|-----|
| 7 | | Describe the basic operating principle of a Unified Power Flow controller (UPFC). Use a schematic diagram to show the arrangement of the two VSCs. | CO3 | L2 | 12M |
|---|--|--|-----|----|-----|

OR

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|---|--|--|-----|----|-----|
| 8 | | Explain the concept of an Interline Power Flow Controller (IPFC). How does it help in balancing power flow between two parallel lines? | CO3 | L3 | 12M |
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UNIT-V

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|---|--|--|-----|----|-----|
| 9 | | Explain the operating principle and circuit configuration of the Thyristor Controlled Phase Angle Regulator (TCPAR). | CO4 | L2 | 12M |
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OR

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|----|--|---|-----|----|-----|
| 10 | | Explain the "Braking" action of a TCBR using the Equal Area Criterion during a three-phase fault. | CO4 | L2 | 12M |
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