

R13

Code No: 118BR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, April - 2018

FUNDAMENTALS OF HVDC AND FACTS DEVICES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) What is the need of static converter in HVDC systems and how is it configured? [2]
- b) Differentiate between 6-pulse and 12-pulse converters? [3]
- c) What do you understand from the term system hierarchy control? [2]
- d) Why is 'control' required in HVDC systems? Draw the converter control characteristics? [3]
- e) Define harmonics. List the causes for harmonics. [2]
- f) What is Individual Phase Control Scheme? What is the effect of harmonics on IPC? [3]
- g) How are FACTS controllers make transmission flexible? [2]
- h) What is the best place to locate STATCOM in transmission system? Why so? [3]
- i) What do you understand from the term compensation? List out the objectives of series compensation? [2]
- j) Which of the two devices characteristics combined in UPFC? [3]

PART - B

(50 Marks)

- 2.a) List out Converter Station Equipment and describe about them in detail.
- b) Explain Modern trends and planning of HVDC Transmission System. [5+5]

OR

- 3.a) Explain the Operation of 6- Pulse Converter with neat circuit diagram. Sketch the wave form and derive the Expression for output Voltage?
- b) List out the factors that decide the converter configuration. [5+5]

- 4.a) Describe firing angle control in HVDC converters.
- b) Explain with the help of control characteristics how the constant current control and constant extinction angle are used to maintain the constant power flow in the HVDC link? [5+5]

OR

- 5.a) Discuss the mechanism involved in starting of DC link.
- b) Describe in detail about current control scheme used in HVDC converters. [5+5]

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6.a) What do you understand from the term reactive power? Explain the causes of reactive power absorbed by HVDC converter substation. [5+5]

b) Write in brief about AC and DC filters used HVDC systems. [5+5]

OR

7.a) Explain in detail how interaction between AC and DC systems takes place with the help of neat diagrams where ever necessary.

b) Distinguish between simultaneous method and sequential method with appropriate diagrams in power flow analysis. [5+5]

8.a) List out the advantages of FACTS controllers used in transmission system in brief.

b) Explain how SVC and STATCOM functions under dynamic situation for shunt compensation along with appropriate diagrams and characteristics? [5+5]

OR

9.a) What are the parameters controlled during series and shunt compensation?

b) Enumerate the various methods available for controllable VAR generation. [5+5]

10.a) Distinguish between TCSC and SSSC.

b) Explain the functioning of static series synchronous compensator (SSSC). [5+5]

OR

11. What is UPFC? Why is it called unified? How active and reactive powers are controlled independently with UPFC? [10]

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