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Code No: 128BR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, July - 2019

FUNDAMENTALS OF HVDC AND FACTS DEVICES

(Electrical and Electronics Engineering)

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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.

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PART - A

(25 Marks)

- 1.a) List out the applications of HVDC. [2]
- b) Draw the circuit diagram of Graetz Bridge. [3]
- c) What will be the current regulation in inverter side? [2]
- d) Explain overlap angle and extinction angle. [3]
- e) What are the conventional control strategies of reactive power? [2]
- f) Write the different types of AC / DC power flow. [3]
- g) Explain power flow in parallel paths. [2]
- h) What are the advantages of shunt compensation? [3]
- i) Discuss the applications of TCSC. [2]
- j) Describe the function of UPFC. [3]

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PART - B

(50 Marks)

- 2.a) With neat sketches explain the different kinds of dc link available?
- b) Explain the Operation of 6- Pulse Converter with neat circuit diagram. Sketch the waveform and derive the Expression for output Voltage? [5+5]

OR

- 3.a) Explain Modern trends and planning of HVDC Transmission System.
- b) Sketch the output DC voltage waveform and voltage across any one valve for 12-pulse Bridge. [5+5]

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- 4.a) Discuss equidistant pulse firing angle control scheme with its relative merits and demerits
- b) Explain the individual characteristics of a rectifier and an inverter with sketches. [5+5]

OR

- 5.a) Explain in detail the equidistant pulse control (EPC) scheme for HVDC. Also list the merits and drawbacks of EPC scheme.
- b) A 6-pulse bridge connected inverter is fed from 238/110 kV transformer which is connected with 3- ϕ , 238 kV, 50Hz supply. Calculate the direct voltage output when the commutation angle is 20° and delay angle α is i) 30° , ii) 90° and iii) 150° . Comment on the results. [5+5]

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- 6.a) Discuss about different harmonic instability problems in HVDC systems.
- b) Compare sequential and simultaneous methods of AC-DC power flow. [5+5]

OR

- 7.a) What is the effect of different control modes on harmonics and their relative magnitudes?
- b) Explain the need for filters in HVDC transmission systems. [5+5]

- 8.a) Discuss the effect of midpoint voltage regulation of a line on power transfer capability.
- b) Explain how SVC and STATCOM functions under dynamic situation, for shunt compensation along with appropriate diagrams and characteristics? [5+5]

OR

- 9. Compare the performance of SVC and STATCOM from the point of view of transient stability improvement. [10]
- 10.a) Explain the different modes of operations of TCSC.

- b) Draw V-I and X-I characteristics curves for single module TCSC and two module TCSC. [5+5]

OR

- 11. Explain the power flow control and oscillation damping in the two area system using UPFC. [10]

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