

**R18**

**Code No: 157BY**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech IV Year I Semester Examinations, July/August - 2023**

**HVDC TRANSMISSION**

**(Electrical and Electronics Engineering)**

**Time: 3 Hours**

**Max.Marks:75**

**Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A**

**(25 Marks)**

- 1.a) Explain the technical performance of HVDC Transmission. [2]
- b) What are the applications of the DC transmission system? [3]
- c) What is the effect of source inductance on converter performance? [2]
- d) What are the desired features of the converter station? [3]
- e) Write the equation of DC Converter Control. [2]
- f) Discuss the modelling of d.c. link. [3]
- g) What are the measures to be taken to reduce corona effect in HVDC transmission lines? [2]
- h) What is the radio interference in HVDC systems? [3]
- i) Explain types of AC filters. [2]
- j) What is the role of the AC filter in HVDC transmission? [3]

**PART – B**

**(50 Marks)**

- 2.a) What are the advantages of HVDC Transmission systems?
  - b) Draw the layout of a Bi-polar HVDC substation and briefly discuss about various components present. [4+6]
- OR**
- 3.a) Explain the analysis of Graetz circuit and waveforms for overlap angle is 60 degrees.
  - b) Explain the working of 12 pulse converter by connecting two-star 3phase converters.[5+5]
- 4.a) Explain the concept of DC power flow control and indicate the necessary control step and the trajectory of the operating point on the HVDC control characteristics.
  - b) What is reactive control and also give the requirements of reactive power in steady state? [5+5]
- OR**
- 5.a) Explain about different sources of reactive power to meet the reactive power requirement of Converters.
  - b) Explain constant current control and constant ignition angle control. [5+5]

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6. Explain in detail the solution of AC-DC power flow using sequential method. Give DC link and converter modeling equations. [10]

**OR**

7.a) Compare simultaneous and sequential methods of power flow analysis.

b) Draw the flow chart for AC/DC load flow. [4+6]

8.a) What are the basic principles of over current protection?

b) Explain about converter faults and protection against over voltage on AC side. [5+5]

**OR**

9.a) Draw a schematic diagram and describe the commutation principle in H.V.D.C. circuit breaker.

b) What are the functions of smoothing reactors and surge arresters? [6+4]

10.a) What are the various types of harmonics present in HVDC system? And explain each of it, in detail.

b) Deduce a relation between converter pulse number and harmonics generation both on source and DC link side. [6+4]

**OR**

11. Explain the design procedure for a single tune filter. [10]

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