

R16

Code No: 137DG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, December - 2019

HVDC TRANSMISSION

(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 as sub questions.

PART - A

(25 Marks)

- 1.a) List out the applications of HVDC. [2]
- b) State the advantages in DC transmission. [3]
- c) Draw the schematic diagram of three & two valve conduction mode. [2]
- d) Define extinction angle control. [3]
- e) With a neat sketch, explain about DC network. [2]
- f) Write the equation of DC Converter Control. [3]
- g) What are the measures to be taken to reduce corona effect in HVDC transmission lines? [2]
- h) What is D.C. circuit breaker? [3]
- i) Write two functions of filter. [2]
- j) What is the effect of pulse number on harmonics? [3]

PART - B

(50 Marks)

2. Draw the layout of a Bi-polar HVDC substation and briefly discuss about various components present. [10]
- OR
3. Derive the expression for input power, output power and power factor of 12-pulse bridge converter with delay angle  $\alpha$ . Assume there is no overlap. [10]
- 4.a) Discuss in detail the principle of DC Link control.
  - b) Explain about different sources of reactive power to meet the reactive power requirement of Converters. [4+6]
- OR
- 5.a) Derive the steady state equivalent circuit of HVDC converter.
  - b) "Converter consume reactive power". Justify the statement. [10]
6. Write short notes on:
    - a) Modelling of HVDC links.
    - b) pu system for DC quantities. [10]
- OR
7. Draw the flowchart and explain about the methods for finding the solution of AC-DC power flow. [10]

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- 8.a) Discuss the operation of surge arrestors for overvoltage protection of HVDC systems.  
b) What are the basic principles of overcurrent protection? [10]

**OR**

9. Write short notes on:

- a) Audible noise      b) Space charge field  
c) Corona effects on DC lines,      d) Radio interference. [10]

- 10.a) Explain the causes of harmonic generation in HVDC and effects on the system.  
b) What are characteristic and non-characteristic harmonics? [4+6]

**OR**

11.a) What are the filter configurations that are employed for HVDC converter station? Give design aspect of one such filter.

- b) Why High pass filters are provided with damping resistor? Also explain about advantages, disadvantages of High Pass Filter. [4+6]

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