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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; May / June - 2019

HVDC Power Transmission

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. Compare AC and DC transmission systems on the basis of economics of power transmission and reliability. 10
- b. What is a DC link? Explain the various types of DC link configuration. 6
- c. Mention important applications and limitations of DC transmission system. 4
- 2 a. Explain the positive technical features of DC transmission compared to AC transmission. 10
- b. Explain the selection of optimum system voltage for a fixed power transfer. 6
- c. Explain modern trends in HVDC acceleration. 4

UNIT - II

- 3 a. What is a power converter? Explain various types of power converter. 8
- b. Explain properties of converter circuits. 4
- c. What is pulse number? Explain the SCR device characteristics. 8
- 4 a. With diagram, explain TURN ON and TURN OFF switching characteristics of thyristor. 10
- b. Explain the characteristics of a 12 pulse converter. 10

UNIT - III

- 5 a. With an equivalent circuit and waveforms analyse the operation of two and three valve conduction in a 6 pulse converter circuit. 10
- b. A Graetz bridge operates with a delay angle of 15° . The leakage reactance of transformer is 10 ohm. The line to line AC voltage is 85 kV. Compute overlap angle and DC voltage for $I_d = 2000$ A. 10
- 6 a. With an equivalent circuit and wave forms, analyse the operation of three and four valve conduction. 10
- b. A Graetz circuit operating at 50 Hz has $V_{L-L} = 440$ V. If AC line inductance $L_C = 1$ H, $\alpha = 15^\circ$, $u = 10^\circ$. Find; 10
 - i) Average current and voltage
 - ii) Equivalent commutation resistance
 Draw equivalent circuit of bridge converter.

Contd...2

UNIT - IV

- 7 a. Explain the principles of DC link centre. 10
- b. Explain basic characteristics of converter stations in a DC link. 10
- 8 a. Explain individual phase control and equidistant pulse centre in a DC link. 10
- b. Explain power control in a DC link. 5
- c. Discuss limitations of manual control of a DC link. 5

UNIT - V

- 9 a. Explain various types of faults that occur in converters. 10
- b. Explain basic concepts of DC circuit breaker and functions of smoothing reactors. 10
- 10 a. What are the characteristics and non-characteristics harmonics? Explain the harmful effects of harmonics and functioning of harmonic filters. 10
- b. Discuss a telephonic interference and factors affecting it. 10

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