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10EE751

**Seventh Semester B.E. Degree Examination, June/July 2018**  
**HVDC Transmission**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, selecting at least TWO questions from each part.**

**PART – A**

- 1 a. Briefly explain about 'The Thury System'. (06 Marks)  
b. What is a valve? Explain about the evolution of valves in brief. (04 Marks)  
c. With the help of single line diagram, explain the constitution of EHV AC and DC links. (10 Marks)
- 2 a. Compare HVAC and HVDC transmission with respect to circuit breakers. (04 Marks)  
b. Summarize the advantages and disadvantages of HVDC transmission. (10 Marks)  
c. List out the principal applications of DC transmission. (06 Marks)
- 3 a. Draw neat sketches of symbol for mercury arc valve with control grid and its idealized characteristics. Explain the idealized characteristics in detail. (10 Marks)  
b. With neat schematics of circuit and waveforms, explain the operation of single phase full wave rectifier which has transformer with center-tapped secondary. Derive the expressions of peak inverse valve voltage and aggregate volt-ampere rating of the valves. (10 Marks)
- 4 a. Draw the schematic circuit diagram of Graetz rectifier and explain its operation with relevant waveforms. Also derive the expression for its peak to peak dc voltage ripple. (12 Marks)  
b. "The Best converter circuit for HVDC transmission is the three-phase bridge" – Justify the statement by explaining its advantages. (08 Marks)

**PART -- B**

- 5 a. Draw the equivalent circuit of bridge rectifier. Derive the relation between AC & DC quantities for the same. (12 Marks)  
b. What are the modified assumptions regarding the ac source for better analysis of the bridge circuits. (08 Marks)
- 6 a. Draw the electrical equivalent circuit of HVDC transmission and explain the basic means of control. (12 Marks)  
b. List out the desired features of control. (08 Marks)
- 7 a. Describe the constant current and constant voltage dc transmission systems. Compare them with respect to fault current and energy loss. (10 Marks)  
b. Plot and discuss the actual characteristics of control scheme of converters. In this context, explain the significance of 'current margin' and its range. (10 Marks)

- 8 a. What are the assumptions made to study the effect of dc reactor on direct current ripple? Derive the expression for the ripple in direct current. (10 Marks)
- b. Find the inductance of the dc reactor required to prevent consequent commutation failure in the inverter described below :
- Number of bridges per pole : 2  
Rated voltage per bridge : 200 kV  
Rated current : 1.80 kA  
 $I_{S2} = 10.0$  kA  
Frequency : 60 Hz  
 $\gamma_n = 16^\circ$   
 $\gamma_m = 8^\circ$
- (10 Marks)

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