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NEW SCHEME

Eighth Semester B.E. Degree Examination, May 2007
Electrical and Electronics Engineering
HVDC Transmission

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Compare AC and DC transmission systems briefly. **(08 Marks)**

b. Explain the factors to be considered while planning for HVDC transmission. **(06 Marks)**

c. Explain the recent trends in HVDC transmission. **(06 Marks)**

2 a. Derive an expression for terminal voltage of the converter considering firing delay and communication overlap. **(10 Marks)**

b. A bridge connected rectifier is fed from 220 kV/110 kV transformer with primary connected to 220 kV

i) Determine the dc output voltage when the commutation angle is 15^0 and the delay angle is 0^0 (zero degree).

ii) If the rectifier delivers 800 amps, determine the effective reactance / phase for $\alpha = 30^0$, E_{ll}(line secondary voltage of the rectifier transformer) = 94, 115 kV and dc voltage, Vd = 100 kV. **(06 Marks)**

c. Name 4 (tons) applications of DC transmission. **(04 Marks)**

3 a. Draw the ideal and actual control characteristics of rectifier and inverter and explain briefly. **(10 Marks)**

b. Explain stability of control by considering damping circuit. **(10 Marks)**

4 a. Explain any three types of converter faults. **(12 Marks)**

b. Explain the causes of over voltages in a converter stations. **(08 Marks)**

5 a. What are the basic principles of over voltage protection and over current protection in HVDC system? **(10 Marks)**

b. Write 6 functions of smoothing reactor. **(06 Marks)**

c. A circuit breaker is used to interrupt a DC line. The parameters are as follows: DC current of 50 A, system voltage = 250 V, breaker counter voltage = 500 V and DC line inductance is 1 Henry. Calculate the energy absorbed by the breaker. **(04 Marks)**

6 a. Explain briefly the function and basic concepts of DC circuit breaker. **(10 Marks)**

b. What are the different types of AC filter? Explain briefly with relevant figures. **(10 Marks)**

7 a. Differentiate characteristics and non-characteristic harmonics. **(08 Marks)**

b. For a converter unit shown in fig.7(b) below, neglecting overlap, find expression for i_A, i_{A_1} and i_{A_2}. **(06 Marks)**

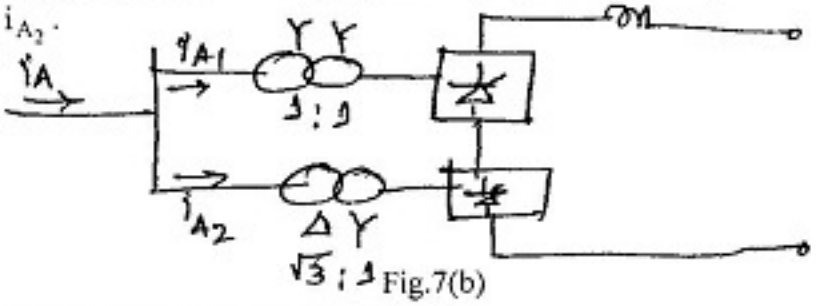

Fig.7(b)

c. What are the applications of DC simulators? **(06 Marks)**

8 a. Explain: i) Valve and converter model ii) Controller model. **(10 Marks)**

b. Explain any two:

i) Constant current control ii) Surge arrestors

iii) HVDC link operation iv) Parity simulator. **(10 Marks)**

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