

**FACULTY OF ENGINEERING & TECHNOLOGY**  
**M.E. (Electrical Power Systems)Year Examination-June-2015**  
**High Voltage D.C. Transmission**  
**(Revised)**

Time: Three Hours

Maximum Marks: 80

“Please check whether you have got the right question paper.”

- i) All question carry equal marks.*  
*ii) Question No. 1 is compulsory.*  
*iii) Attempt any three questions out of remaining questions.*  
*iv) Assume suitable data if necessary.*

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|-----|----|---|----|
| Q.1 | a) | With the help of circuit diagram. Analyses the operation of 3 valve conduction mode and derive expression for the current of incoming and outgoing valves during commutation. | 08 |
|     | b) | Derive expression for D.C. voltage and voltage drop due to overlap and hence deduce equivalent circuit of bridge rectifier.   | 08 |
|     | c) | Prove that the delay angle is same as the P.F. angle for a convertor circuit without overlap (neglecting losses).   | 04 |
| Q.2 | a) | With reference to HVDC converter control system explains.<br>1) Constant current control.<br>2) Constant extinction angle control.  | 06 |
|     | b) | Explain hierarchical control structure for a D.C. link.   | 04 |
|     | c) | Explain what is EPC? Explain different methods of EPC.  | 10 |
| Q.3 | a) | Explain the causes of over voltage in a convertor station.  | 06 |
|     | b) | Explain principle of over current protection in a pole.   | 08 |
|     | c) | What is meant by reactive power control? How is it achieved?  | 06 |
| Q.4 | a) | Explain how D.C. circuit breakers are characterized based on variable of interest in their application to the system.   | 06 |
|     | b) | Derive an equation for harmonic voltage and current for single tuned filter and discuss the influence of network admittance on design accept.                                 | 14 |
| Q.5 | a) | Discuss the advantages and disadvantages of series and parallel MTDC system.  | 10 |
|     | b) | Explain two ACR methods for control of MTDC system.   | 10 |
| Q.6 | a) | Write model of two terminal D.C. networks.  | 10 |
|     | b) | What do you understand by power flow analysis? What are the major steps in the power flow analysis for MTDC – AC system.  | 10 |
| Q.7 |    | Write short notes on  | 20 |
|     |    | 1) Surge arrester in HVDC system  |    |
|     |    | 2) Smoothing reactor  |    |
|     |    | 3) p. u. system   |    |
|     |    | 4) corona in D.C. line.   |    |