

Total No. of Questions : 10]

SEAT No. :

P4777

[Total No. of Pages : 2

[5561]-590

**B.E. (Electrical Engineering)  
HVDC and FACTS - B  
(2015 Pattern) (End Semester)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**Q1)** For six pulse full wave bridge circuit, state the assumptions made in deriving the expression for ideal dc voltage. Draw diagram and derive the expression for ideal dc voltage. **[10]**

OR

- Q2) a)** Explain converter operation as inverter. Define extinction advance angle  $\gamma$  and ignition advance angle  $\beta$ . **[6]**
- b) Peak of line to neutral on secondary side of converter transformer is 76.829 KV. It is required to obtain a dc voltage of 100 KV from bridge connected rectifier operating with delay angle  $\alpha=30^\circ$  and overlap angle  $\mu=15^\circ$ . Calculate the commutation reactance per phase if rectifier delivers 100 A dc. **[4]**

**Q3)** Explain multiterminal HVDC system. State applications of MTDC. Draw series and parallel MT HVDC systems and compare them. **[10]**

OR

- Q4) a)** Discuss the two applications of HVDC light. **[6]**
- b) Explain the steps to be taken in sequence when fault occurs on dc side of HVDC system. **[4]**

**P.T.O.**

**Q5)** Explain what is meant by the static power converter structures? Explain the basic rules for association of source and load to two sides of static converter. Also with two examples, explain the term AC controller. **[16]**

OR

**Q6)** a) Write note on dc link converter topologies. **[8]**

b) Write note on harmonic control produced in HVDC system. **[8]**

**Q7)** a) Explain operation of TCSC with neat diagram. **[9]**

b) Compare inductive and capacitive vernier mode operation of TCSC. Differentiate between bypass breaker mode and bypass thyristor mode of TCSC. **[9]**

OR

**Q8)** a) Explain how midpoint shunt compensation rapidly increases the transmittable power. **[9]**

b) Explain the conditions for transient free switching of TSC. **[9]**

**Q9)** Explain basic operating principles and implementation of UPFC by two back to back voltage sourced converters. **[16]**

OR

**Q10)**a) Write note on control structure of UPFC. **[8]**

b) Explain power flow studies in UPFC embedded system with Operational constraint. **[8]**

