

Total No. of Questions : 8]

SEAT No. :

P3793

[5561]-194

[Total No. of Pages : 2

B.E. (Electrical)
HVDC AND FACTS
(2012 Course) (Elective-III) (403149B)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any Q1 or Q2, Q3 or Q4, Q5 or Q6, and Q7 or Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Draw Graetz circuit. Label various parts. Derive an expression for dc voltage with ignition delay angle α . **[8]**

b) Draw neat diagrams of radial and mesh type multi terminal HVDC system and compare between them. **[8]**

c) It is required to obtain a dc voltage of 100kV from a bridge connected rectifier operating with ignition delay angle $\alpha = 30^\circ$ and overlap angle $\mu = 15^\circ$. Calculate necessary secondary line voltage of rectifier transformer required. **[4]**

OR

Q2) a) Compare HVDC light technology with HVDC classic and explain the applications of HVDC light technology. **[12]**

b) Explain ground return and metallic return operation of bipolar system when fault occurs. **[8]**

Q3) a) With suitable diagram explain back to back converter operation. State its advantage and also state applications. **[8]**

b) Explain characteristic and non-characteristic harmonics produced by HVDC system. State remedial actions to control them. **[8]**

OR

P.T.O.

Q4) a) Explain with diagram dc link converter. State its applications & roll played by capacitor. [8]

b) Explain AC controller based structures. [8]

Q5) a) Explain how midpoint shunt compensation rapidly increases the transmittable active power. [9]

b) Draw diagram of TCR and explain its current control with delay angle. Write expression for fundamental reactor current. Draw waveforms of voltage and current with delay angle. [9]

OR

Q6) a) With diagram explain operation of TSC. Draw operating VI area of TSC. [9]

b) Explain principle of operation of STATCOM. Draw relevant phasor diagram. [9]

Q7) a) Explain overall control structure of UPFC. [8]

b) Explain relevant phasor diagram illustrating transmission control capabilities of UPFC. [8]

OR

Q8) a) Draw UPFC configuration. What are operational constraints for UPFC. [8]

b) Draw block diagram of UPFC and explain the function of each block. [8]

