

(3 Hours)

(Total Marks : 80)

N. B.

- (1) Question No. 1 is **compulsory**.
- (2) **Attempt** any **three** questions out of remaining questions.
- (3) **Figures** to the **right** indicate **full** marks.
- (4) **Assume** suitable **data** if **necessary**.

1. Solve any **four** :- 20
 - a) Compare HVDC links and state application of each
 - b) Classify the faults in HVDC
 - c) Explain EPC scheme of firing of HVDC converter bridge
 - d) Create complete control characteristics HVDCT
 - e) Show placement of harmonic filters in HVDCT
2.
 - a) Discuss desired features of control of HVDC and explain basic control characteristic 10
 - b) Investigate that double commutation failure is a self-clearing fault. 10
3.
 - a) A 3-phase bridge rectifier has input voltage 345KV. Calculate DC voltage output when μ is 15° and α (i) 0° (ii) 15° (iii) 30° . 10
 - b) For a bridge converter with grid control and overlap less than 60° . Prove that 10

$$\cos\theta \cong \cos\alpha - \frac{R_c \cdot I_a}{V_{do}}$$
4.
 - a) Illustrate use of bypass valve in HVDC 10
 - b) How 'Power reversal' is done in HVDC? 10
5.
 - a) Explain over voltage and over current protection of HVDC 10
 - b) Illustrate with neat diagrams and wave forms the principal of twelve-pulse converter. 10
6.
 - a) Summarize the harmonics and filters in HVDCT 10
 - b) Discuss in detail - 'Ground return' 10