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Paper Code : PE-EE 602B/PE-EEE 602B Power Quality And Facts

UPID : 006605

Time Allotted : 3 Hours

Full Marks :70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]
- (I) Complete loss of voltage or current for a time period is known as _____
 - (II) For mitigating _____ based power Quality problems in distribution system, DSTATCOM should be used.
 - (III) UPQC Stands for _____
 - (IV) Series Capacitive compensation in EHV transmission lines is used to _____
 - (V) A static VAR compensator is a -----
 - (VI) SSSC is a _____ compensation device.
 - (VII) A Device whose output current which is either inductive or capacitive can be controlled effectively the system potential difference is known as _____.
 - (VIII) SVS stands for _____
 - (IX) The example of isolation between circuits is _____
 - (X) Why VSC based DSTATCOM is widely used compare to CSC based configuration's?
 - (XI) Synchronous Generator is an _____ line Compensator.
 - (XII) In TSC-TCR, the voltage signal for the controller is taken from the high voltage SVC bus using _____.

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. What is the comparison between Series Compensation and Shunt Compensation? Write down one compensator each for Series and Shunt Compensation. [5]
3. What is the basic operating principle of FC-TCR type controller with proper diagram? [5]
4. Explain the basic Operating principle of Unified Power Flow Controller connected in sending end, receiving end and at the midpoint. [5]
5. Describe the loss vs. line current characteristics of thyristor controlled series Capacitor with neat diagram. What are the basic and Practical components comprises of a TCSC module? [5]
6. Classify the Power System Transient on the basis of the causes. Also specify the corresponding causes. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) With detailed explanation discuss the various control approaches of unified power quality compensator. [7]
- (b) Draw and explain the three-phase four-wire right shunt UPQC topology with a four-leg VSC-based DSTATCOM and DVR with neat diagram. What are the power quality mitigating devices? [5+3]
8. (a) How STATCOM should be used to improve the power oscillation damping of the transmission line? In between SVC and STATCOM which controller is most suitable for above purpose and why? [7]
- (b) What are the comparison between STATCOM and SVC in their applications? [4]
- (c) What are the control approaches of STATCOM with detailed justification? [4]
9. (a) Explain the active & reactive power flow in shunt compensation at the midpoint of a two machine power system with phasor diagram and Power angle characteristics. [7]
- (b) What is FACTS Controllers? Classify it properly. [4]
- (c) What are the problems in series compensation? Explain how series compensation can be used for power oscillation damping [4]

10. (a) What is the need of estimating voltage sag performance? Explain the different methods of estimating voltage sag performance. [8]
- (b) What do you mean by Electric Power Quality? What are the needs of Power Quality Assessment? Classify the Power System Disturbances responsible for Power Quality Problems. [7]
11. (a) How can DSTATCOM should minimized the Reactive Power Compensation? Give detailed justification. [7]
- (b) With proper diagram discuss how harmonics and unbalance should be mitigated in Distribution system using DSTATCOM. [8]

*** END OF PAPER ***