Reg. No. :

Question Paper Code : **X86868**

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Second Semester
Power Systems Engineering
PS5202 – HVDC AND FACTS
(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. List the conventional control mechanisms in voltage control.

2. What are the differences between the TSC and TCR ?

3. Propose the basic circuit of STATCOM.

4. What are the advantages of TSC-TCR type SVC over FC-TCR type SVC ?

5. What are the various functions of SSSC ?

6. What are the limits which define the capability characteristics of TCSC ?

7. What is the necessity for control in a DC link ?

8. What are the assumptions made in analyzing a six pulse converter ?

9. Define the unified method of DC power flow.

10. What are the advantages of variable elimination method over extended variable method ?

PART – B   (5×13=65 Marks)

11. a) Explain the various types of conventional voltage control mechanisms in electrical transmission network with neat sketch.

(OR)

b) Derive the expression for active as well as reactive power flow in a lossless transmission line ? Draw necessary phasor diagram.

12. a) Explain the transient stability enhancement of SMIB system using SVC.

(OR)

b) Explain the basic operating principle and the control capability of STATCOM.

13. a) Explain the power flow control and damping of oscillations in the two area system using UPFC.

(OR)

b) Explain the working, characteristics and operating modes of variable reactance model of thyristor controlled series capacitor.

14. a) Show that in a 3 phase bridge rectifier operating with no delay and with 60 degree overlap, the direct current is one-half of the crest value of line to line short circuit on the secondary side of the transformer bank.

(OR)

b) Express the relation between the DC output voltage and AC line voltage (rms) and rating of the converter transformer with Graetz's converter circuit.

15. a) With a neat flow chart explain the solution of ac-dc power flow.

(OR)

b) Explain substitution of power injection method for solving AC-DC load flow problem.

PART – C   (1×15=15 Marks)

16. a) An HVDC converter rated 100 MW at 100 kV on the dc side has a commutation reactance of 0.2 p.u. The delay angle is varied between 5 and 20. Calculate the converter transformer rating and percentage of tap-changing required. Also calculate the rating of the condenser to make the p.f. on the primary side of the converter 1.0.

(OR)

b) Develop the basic mismatch equation for a bipolar dc link. And also explain the formulation of jacobian matrix for unified solution of ac dc equations. Illustrate the modification carried out for PDC-QDC interactions.

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