AQ – 2878

Second Semester M. E. (Electrical and Electronics) Examination

FLEXIBLE AC TRANSMISSION SYSTEMS

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P. Pages : 3

Time : Three Hours]　　　　　　　　　　　　　　　　　　　　　[Max. Marks : 80

Note : (1) Separate answer book must be used for each section in the subject Geology, Engineering material of civil branch and Separate answer–book must be used for Section A and B in Pharmacy and Cosmetic Tech.
　　　　(2) All questions carry marks.
　　　　(3) Answer **Three** questions from Section **A** and **Three** questions from Section **B**.
　　　　(4) Due credit will be given to neatness and adequate dimensions.
　　　　(5) Assume suitable data wherever necessary.
　　　　(6) Diagrams and Chemical equations should be given wherever necessary.
　　　　(7) Illustrate your answer wherever necessary with the help of neat sketches.
　　　　(8) Use pen of Blue/Black ink/refill only for writing the answer book.

SECTION A

1. (a) For efficient and reliable operation of power systems, the control of voltage and reactive power should satisfy some objectives, explain the objectives to be satisfied.　　　7

   (b) Discuss the significance of reactive power in power system. Explain clearly the concept of reactive power in single phase and three phase circuits. 7

OR

2. (a) Explain the principle and benefits of Flexible A.C. Transmission (FACT) Systems.　　　7

   (b) Explain how powerlow control can be achieved by phase angle regulators.　　　7

3. (a) Explain how TCR can be used for over voltage compensation of transmission line.　　　7

   (b) Explain the application of TSC for reactive power compensation.　　　6

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OR

4. (a) Explain why TCR is preferred over TSC when it is desired to have a reactive power compensator with continuous control of current. 7

   (b) Explain objectives of short compensation. 6

5. (a) A three phase 400 KV, 50 HZ, 900 km long line is operating with $VS=VR=V=1.0$ p.u. and $\delta=60^0$. A SVC is planned to be connected at the midpoint of the line to increase the power transfer capability. The limits on the control range correspond to $\delta=30^0$ and $\delta=90^0$.

   (i) Find the limits of SVC susceptance if the slope (Xs) of the control characteristic is (i) 0.0 and (ii) 0.05 p.u.

   (ii) What is the maximum power flow in the line for the two cases, (i) Xs = 0.0 and (ii) Xs = 0.05 (Data : $Z_n = 300$ ohms and $\beta = 0.06^0/$ km). 7

   (b) Explain in detail the dynamic performance of SVC. 6

OR

6. (a) Explain how power oscillations damping and sub-synchronous damping can be achieved using SVC. 7

   (b) Explain how transient stability improve using SVC. 6

SECTION B

7. (a) Explain the variable reactance model of TCSC with neat diagram. 7

   (b) Explain the different applications of TCSC. 7

OR

8. (a) What is series compensation in transmission system ? What are the series compensation schemes available using thyristor ? 7

   (b) Describe the principle of operation of thyristor controlled series compensator. 7

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9. (a) Explain the operation of STATCOM with characteristics. 7

    (b) Compare STATCOM with SVC. 6

OR

10. (a) Explain the operation of SSSC with characteristics . 7

    (b) Describe the capability of SSSC to provide Real Power Compensation. 6

11. (a) State and explain the basic operating priciple of UPFC. Also describe the scheme for its implementation. 7

    (b) Illustrate with phasor diagram, the control of real and reactive power using UPFC. 6

OR

12. (a) Explain the dynamic performance of the Unified Power Flow Controller (UPFC) with neat schematic. 7

    (b) Explain UPFC with block diagram in brief. 6

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