Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

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B.Tech.(EE / Electrical & Electronics) (2011 Onwards E-I)   (Sem.–6)
FLEXIBLE AC TRANSMISSION SYSTEMS
Subject Code : BTEE-605B
M.Code : 71153

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1.   **Answer the following in short :**

   (a) List out the shunt types of FACTS controllers.

   (b) Draw the control characteristics of SVC and explain in brief.

   (c) Draw the basic circuit of TCR.

   (d) What are the needs of FACTS controller in modern power system?

   (e) Write the list of FACTS devices to control the line power flows.

   (f) Write the objectives of reactive power compensation.

   (g) List the various modes of operation of TCSC.

   (h) Draw the basic circuit of SSSC.

   (i) Write the significance of sub synchronous resonance.

   (j) Define UPFC.

SECTION-B

2. Describe working principle of SSSC with neat diagram. Give the representation of SSSC in transmission line and also describe its control characteristics.

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

4. Explain the working of thyristor control phase angle regulator (TCPAR) and also discuss the power transmitted through quadrature booster with neat diagram.

5. By using power angle curve explain how by changing the value of line impedance the maximum amount of active power flow will change?

6. Explain the working and characteristics of STATCOM with a neat sketch. In what way it differs from SVC.

SECTION-C

7. A 400kV, 50Hz, 600km long symmetrical line is operated at the rated voltage.

   (a) What is the theoretical maximum power carried by the line? What is the midpoint voltage corresponding to this condition?

   (b) A series capacitor is connected at the midpoint of the line to double the power transmitted. What is its reactance?

   (c) A shunt capacitor of value 450ohms is connected at the midpoint of the line. If the midpoint voltage is 0.97. compute the power flow in the line corresponding to this operating point.

   Data : $l = 1mH/km$, $c = 11.1 \times 10^{-9}$ F/km.

8. (a) Explain the modelling of SSSC for transient stability studies.

   (b) Explain, modelling of UPFC for power flow studies.

9. (a) Draw and explain about the interactions between SVCs in the ac power system without series compensation.

   (b) How series FACTS devices responds to the problem of sub-synchronous resonance?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.