Hall Ticket Number:

Code No. : 7131

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.E. (EEE: CBCS) I-Semester Main Examinations, Jan./Feb.-2017

(Power Systems & Power Electronics)

Application of Power Electronics to Power Systems

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. What are the factors that limit loading capability of transmission line?
2. Write about the benefits of FACTS devices.
3. List the objectives of shunt compensation.
4. Draw the regulation slope characteristics of STATCOM.
5. Draw the power angle characteristics of series compensated two machine model system with 0%, 50%, &75% of series compensation level.
6. Series compensation can be used for power oscillation damping. Explain briefly.
7. Give the block diagram representation of the internal control structure of UPFC.
8. Write the salient features of UPFC.
9. List the loads that are causing power quality problems in distribution systems.
10. Give the representation of wave form distortion due to 3^{rd} harmonic component.

Part-B (5 × 10 = 50 Marks)

11. a) Derive the expression for active as well as reactive power flow in a lossless transmission line. Draw necessary phasor diagram. [5]

    b) Draw the line diagram of transmission system with TSC and also write the transient free switching conditions. [5]

12. a) Explain the principle of operation of STATCOM with the help of neat diagrams. [5]

    b) Analyze the performance characteristics of the TC-TSR. [5]

13. a) Explain the operation of GTO thyristor controlled series capacitor with line diagram and current and voltage wave forms. [5]

    b) With help of power angle curve explain how transient stability is improved with the series controllers. [5]

14. a) Draw the block diagram of basic control system used for P and Q control in case of UPFC. [5]

    b) Explain about the UPFC multifunctional characteristics with the help of vector diagrams. [5]

15. a) According to IEEE standard, list power quality issues. [5]

    b) With the help of neat diagrams, explain about shunt active filter used to mitigate the harmonics in distribution systems. [5]

Contd... 2

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16. a) Give the classification of FACTS controllers. [4]

    b) Write about the operating principle of TCSC for

    i) Inductive boost mode *ii)* Capacitive boost mode. [6]

17. Answer any ***two*** of the following:

    a) Write short notes on SSSC. [5]

    b) Write about independent real and reactive power flow control using UPFC. [5]

    c) Adapt a hybrid filter to mitigate harmonics. [5]