THAPAR UNIVERSITY, PATIALA

END-SEMESTER TEST

Subject: Power Quality & FACTS Devices (PS-005)
Session: Jan.-June, 2007
Course Instructor: Parag Nijhawan
M.Marks: 90 **Time: 3hours**

Instructions:. ***Attempt all questions.*** The weightage of each question is indicated. Attempt all parts of one question at one place, otherwise, part(s) done at subsequent place(s) will be taken as over-attempt(s). Assume any missing data, if required. Notations have their usual meaning.
NOTICE: Evaluated answer sheets will be shown to the students on 29/05/2007 at 10.30AM in C-104.

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1) a) What is 'electric power quality'? What are the various causes of power quality problems? Discuss in detail.

   b) Obtain the PIM model for Static Synchronous Series Compensator. (9,9)

2) a) What are the major concerns of both power customers and utility? Discuss these in detail.

   b) What is a CBEMA curve? What is the purpose of this curve? (12,6)

3) a) Prove that active power is a function of voltage phase angle and reactive power is a function of voltage magnitude.

   b) Draw the block diagram of a UPFC and also discuss the purpose of two converters of the UPFC.

   c) What is the principle of operation of a phase shifter? Also, draw the characteristic curves of the phase shifter. (6,6,6)

4) a) Discuss how converter fed d.c. drives act as source of harmonics.

   b) Discuss the complete analysis of single-phase active filter, including the control circuit of the DC bus-bar voltage. (6,12)

5) Write short notes on the following:

   a) Modulated Phase Control

   b) Voltage harmonics produced by synchronous machine

   c) STATCOM (6,6,6)