Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: HVDC & FACTS [ELE 433]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 28 December 2016** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1 A. A 400KV, 50 Hz symmetrical transmission line is compensated by connecting a capacitor in series at the midpoint of the line. Design the capacitor to increase the maximum power transferred through the line by 10% for transmission lines i) 200Km long and ii) 250Km long.

l=1mH/Km and c=11.1nF/Km. ***(05)***

1 B. Draw the equivalent circuit diagram of an SVC. Explain its working principle. ***(05)***

2 A. A 66KV, 50Hz line with line parameters l=1mH/Km and c=11.1nF/Km. Design a STATCOM (controlled by SPWM method) to maintain uniform voltage throughout the line of length 100Km. ***(05)***

2 B. Draw the circuit diagram of a 3 phase 3 level cascaded H-bridge multi-level. Explain the operating principle and draw the waveforms of pole voltage, line voltage and phase voltage of any one phase. ***(05)***

3 A. Draw a schematic diagram of the feedback control system of STATCOM. Explain its working. ***(05)***

3 B. Compare SSSC and TCSC connected in series at the midpoint of the transmission line. ***(05)***

4 A. A 22KV, 50Hz symmetrical line with parameters l=1mH/Km and c=11.1nF/Km is compensated with TCSC connected at the midpoint of the line. The length of the line is 200Km. Design the TCSC to transmit any power at constant δ of 10˚. ***(05)***

4 B. Draw the equivalent circuit diagram of a UPFC connected to the transmission line. Explain its operation. ***(05)***

5 A. Draw the schematic diagram of a HVDC converter station and explain each part. ***(05)***

5 B. Explain the schemes for interconnecting two areas of different frequencies, draw the schematic diagram. ***(05)***

6 A. The input voltage of the HVDC rectifier is 80KV, Find the current and the average output voltage if a) α=10˚ and u=10˚ b) α=20˚ and u=15˚ transformer leakage reactance 10Ω ***(05)***

6 B. Explain overcurrent and overvoltage protection schemes in HVDC system converters. ***(05)***