Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) MAKEUP EXAMINATIONS, JUNE 2017

SUBJECT: POWER SYSTEM OPERATION & CONTROL [ELE 4008]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 20 June 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Use of non-programmable scientific calculator is permitted

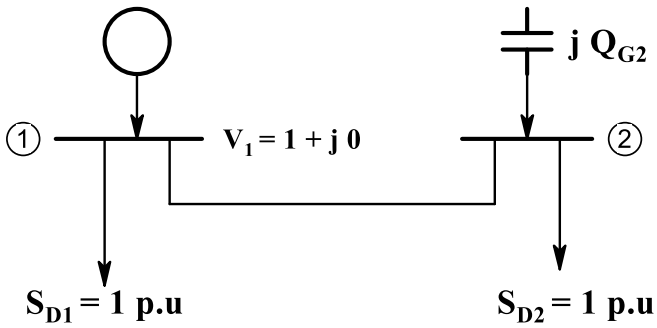
1A. With suitable notations draw the circuit model of a 3 phase salient pole alternator. ***(6)***

1B. A synchronous machine is working under steady state condition. Determine vd, vq, id, and iq, given Va = 1∠+30° , Ia = 0.9 ∠-20° p.u and δ = 15°. ***(4)***

2A. A DC generator provides excitation to a salient pole alternator. Determine its transfer function. ***(5)***

2B. A 220 kV (line to line) short transmission line is 40 km long. The resistance per phase is 0.15 Ω per phase and inductance of 1.3263 Ω per phase. If the transmission line supplies a load of 381 MVA at 0.8 p.f lag at 220 kV (Line to Line), determine the sending end voltage. ***(5)***

3A. For the system shown in fig below, determine the kVAR rating of the capacitor bank to be connected to Bus 2 so as to maintain its voltage at unity. The line impedance between bus 1 and 2 is j 0.5 p.u.



(6)

3B. A transmission line having an impedance of ZL = 0.3902 ∠1.85° Ω, connects a generator bus maintained at 1∠0° and a load bus. Determine the condition to receive maximum active power. ***(4)***

4A. Bring out the differences between series compensation and shunt compensation of transmission lines. ***(4)***

4B. With neat diagram explain how a STATCOM provides compensation in transmission line. ***(6)***

5A. With neat diagrams explain the input output characteristics for hydro generating units ***(3)***

5B. Fuel input in MBtu for two units is as given below:

$$H_1 = 8\,P_1 + 0.024\,P_1^2 + 80$$

$$H_2 = 6\,P_2 + 0.04\,P_2^2 + 120$$

Where, Pn is the unit output in Megawatts with a minimum loading of 20 MW and maximum loading of 100 MW. Using Lambda iteration method determine the economic dispatch if the total load to be supplied is 150 MW by the following methods. Show two iterations. Cost of fuel is 1.5 R/ MBtu. ***(7)***