Reg. No.



## **VII SEM. B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)**

## **MAKE-UP EXAMINATIONS, MAY 2018**

## SUBJECT: POWER SYSTEMS OPERATION & CONTROL [ELE 4008]

REVISED CREDIT SYSTEM

Time:9.00 AM – 12.00 PM	Date: 10 May 2018	Max. Marks: 50
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## Instructions to Candidates:

• Answer **ALL** the questions.

Use of non-programmable scientific calculator is permitted.

**1A.** For the system shown in Fig. 1, determine the inductance of coil 'A' if the current flowing in coil 'A' is  $i_a = I_m \sin(\omega t - 30)$  and through coil 'F' is  $i_F = I_F$ 



Fig. 1	(06)
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- **1B.** Prove that the Park's transformation has the property of power invariance. (04)
- **2A.** A three phase synchronous generator in a hydroelectric generating station is excited using a DC generator coupled to its shaft. The synchronous generator is expected to maintain rated voltage at its terminals for various loads. To ensure the same, a feedback from the AC generator's output is used to control the excitation to the DC generator thru suitable amplifier stage. Discuss the stability of the system for various values of gain.
- **2B.** Discuss the various factors that influence the power handling capability of transmission lines. *(04)*
- **3A.** A lossless AC transmission line of 400km long has  $\beta$ =0.0013 rad/km. The sending end voltage is 1.2 p.u and the receiving end is open circuited. Draw the voltage profile and current profile in the transmission line considering the characteristic impedance equal to 250  $\Omega$ .
- **3B.** What is the need for compensation of transmission lines?
- **4A.** With neat diagram explain how a unified power flow controller (UPFC) can used to provide real and reactive power compensation in a transmission line. *(06)*

(06)

(06)

(04)

**4B.** For the system shown in Fig.4 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 j0.4 p.u.



- **5A.** Formulate the economic dispatch problem for 'N' no. of thermal power plants supplying a total load of 'P<sub>L</sub>' through a transmission network with a total line loss amounting to 'P<sub>LOSS</sub>'. Also, bring out the importance of scheduling the generators for economic operation.
- **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, ' $P_n$ ' 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. (07)

(04)

(03)