Registration No. :

Total number of printed pages – 2

Seventh Semester Back Examination – 2014
POWER SYSTEM OPERATION AND CONTROL
BRANCH : ELECTRICAL
QUESTION CODE : L 148

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2×10

   (a) What do you mean S.I.L. ?

   (b) What is the reactive power and how it is related to bus voltage ?

   (c) Explain the term 'Jacobian'.

   (d) How buses are classified in a power system ?

   (e) Why the acceleration factor is used in a load flow analysis ?

   (f) What is penalty factor and what is its unit ?

   (g) What is economic load dispatch ?

   (h) What is a 'Tie line' bias in a power system ?

   (i) What do you understand by control area ?

   (j) Define critical clearing angle.

2. (a) A three phase load draws 400 kW at a power factor of 0.707 lagging from a 440 V line. In parallel with this load is a three phase capacitor bank which draws 50 kVA. Find the total current and the resultant power factor.   5

   (b) Explain the significance of single line diagrams in a power system by giving a suitable example.   5

3. (a) What is load flow solution ? Explain its significance in power system Analysis.   5

P.T.O.

(b) Considering a four bus system the Line impedances are given as below :

Bus 1 to Bus 2	$j0.5 \ \Omega$
Bus 2 to Bus 3	$j0.5 \ \Omega$
Bus 3 to Bus 4	$j0.4 \ \Omega$
Bus 4 to Bus 1	$j0.25 \ \Omega$
Bus 3 to Bus 1	$j0.5 \ \Omega$

Draw the configuration of the system and also find the bus Admittance matrix. 5

4. (a) Derive the conditions to be satisfied for economic operation of a lossless Power system. 5

(b) A System consist of two generating unit with Fuel cost of

$$F1 = 0.05P_1^2 + 20P_1 + 2 \qquad Rs/MW \ hr$$
$$F2 = 0.075P_2^2 + 22.5P_2 + 1.8 \quad Rs/MW \ hr$$

The system operates on economical dispatch with 100 MW of power generation by each plant. The ITL of plant 2 is 0.2. Find the penalty factor of plant 1. 5

5. (a) Derive an expression for static error frequency and tie line power in an identical two area system. 5

(b) Draw and explain the generator load model and represent it by block diagram. 5

6. (a) Explain the concept of control area. Discuss the power frequency characteristic of an inter connected system. 5

(b) Explain the transient response of the ALFC loop. 5

7. (a) Explain the step by step solution of the Swing Curve. 5

(b) A power deficit area receives 50 MW over a tie line from another area. The maximum steady state stability of the tie line is 100 MW. Find the allowable sudden load that can be switched on without loss of stability. 5

8. Write short notes on any **two** : 5×2

(a) Complex Power and Power Triangle

(b) Dynamic response of a two area system

(c) Automatic Load Dispatching.

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