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Total number of printed pages – 2

B. Tech  
PCEL 4401

**Seventh Semester (Special) Examination – 2013**

**POWER SYSTEM OPERATION AND CONTROL**

**BRANCH : EEE**

**QUESTION CODE : D 403**

**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) Why power factor correction is required in a large power system ?
  - (b) Write down the static Load flow equation (SLFE).
  - (c) Explain the term Sparsity.
  - (d) What are the Various type of buses exist in a power system ?
  - (e) Why Newton Raphson method is superior to Gauss Siedel method ?
  - (f) Explain the role of economic dispatch controller in a power system.
  - (g) Explain the necessity for maintaining constant frequency in power system.
  - (h) Why steady state stability limit is more than the transient state stability limit ?
  - (i) What are the two major control loops used in large generator ?
  - (j) What do you mean by stiffness factor of synchronous machine ?
2. (a) What do you understand by reactance diagrams in a power system ? Explain by giving a suitable example ? What are the advantages of pu system ? 5
- (b) What is Complex power ? Also explain various sources for reactive power generation. 5

P.T.O.

3. (a) Considering a four bus system the Line impedances(pu) are given as below :

Bus 1 to Bus 2	$0.8 + j 0.24$
Bus 2 to Bus 3	$0.2 + j 0.6$
Bus 1 to Bus 3	$0.6 + j 0.18$
Bus 2 to Bus 4	$0.5 + j 0.15$

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

- (b) Draw the flow chart of Gauss Siedel method for load flow study including PV buses & explain each block. 5
4. (a) Explain input-output curve, heat rate and incremental heat rate in thermal generating units. 5
- (b) In a two plant system the entire load is located at plant 2, which is connected to plant 1 by a transmission line. Plant 1 supplies 200 MW of power with a corresponding transmission loss of 10 MW. Calculate the penalty factors for the two plants. 5
5. (a) With the help of schematic diagram explain the Load frequency control loop and its operation. 5
- (b) Draw and explain the generator load model and represent it by a block diagram. 5
6. (a) Explain speed governing system by drawing suitable block diagram along with mathematical derivations. 5
- (b) What is meant by control area ? Develop the complete linearised model of a two area interconnected power system showing the complete block diagram. 5
7. (a) Distinguish between Steady state and transient stability of Power systems. Derive power angle equation. 5
- (b) A 4 pole, 50 Hz, 33 kV turbo alternator has rating of 100 MVA, pf 0.8 (lag). The moment of inertia of rotor is  $10000 \text{ kg-m}^2$ . Determine the M and H. 5
8. Write short notes on any **two** : 5×2
- (a) The Power Triangle
- (b) Automatic Generation Control
- (c) Synchronizing Coefficient.