Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(EE) (2012 Onwards E-II)    (Sem.–7,8)**

# POWER SYSTEM OPERATION AND CONTROL

### Subject Code : BTEE-804A
### M.Code : 71936

Time : 3 Hrs.                                                          Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

### SECTION-A

1.    **Answer briefly :**

   a.   Define per unit droop.

   b.   What decides the loading of generating stations?

   c.   Give two conditions for proper synchronizing of alternators.

   d.   What is the function of load frequency control?

   e.   Define Spinning Reserve.

   f.   What are the advantages and disadvantages of synchronous compensators?

   g.   What is the purpose of primary ALFC?

   h.   Write the condition for the optimal power dispatch in a lossless system.

   i.   Define area control error.

   j.   Define state estimation.

## SECTION-B

2. Describe the automatic excitation control (IEEE Type 1) for alternators.

3. Describe the modelling of Modelling for contingency analysis.

4. Describe the turbine and speed governing systems.

5. Discuss the voltage stability of power system. What are the suitable effective counter measures to prevent voltage instability?

6. Derive the necessary formula for active power scheduling taking into effect of transmission loss and also derive the exact and approximate expressions for penalty factor.

## SECTION-C

7. Use the method of Lagrangian multiplier to derive the operating criteria for a large number of units.

8. Derive the suitable mathematical formulation for voltage stability of a two bus radial systems and correlate it with the PV curve for different values of power factor and QV characteristics for different Values of P/Pmax.

9. Consider a steam station with two units having input output characteristics as follows :

$F_1 = 80 + 8P_1 + 0.024P_1^2$

$F_2 = 120 + 6P_2 + 0.040P_2^2$

where F represents the production cost.

In scheduling a load of 100 MW by equal incremental cost method, the incremental production cost of unit 1 is wrongly specified by 10% more than the true value while that of unit 2 is specified by 6% less than the true value. Find the following :

a. The change in generation schedule and

b. the change in the total cost of generation.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**