

Roll No.

Total No. of Pages : 02

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**B.Tech.(EE)(2011 Onwards E-II)**  
**B.Tech.(Electrical & Electronics) (2011 & 2012 Batch 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) List the components of a speed governing system
- b) State the main objectives of reactive power and voltage control in power systems.
- c) Draw and explain the heat rate characteristics of a thermal unit.
- d) Explain the necessary condition for operating the power system at optimal cost.
- e) Compare unit commitment and economic dispatch problem.
- f) Distinguish primary, secondary and tertiary feedback loops in load frequency control.
- g) Explain area control error and its role in ALFC.
- h) Explain power transmission loss formula.
- i) Draw diagram of P-f Control loop.
- j) What are the factors affecting short term and long term hydro-thermal scheduling?

### SECTION-B

2. The fuel cost characteristics of three units in a plant are:

$$C_1 = 0.004 P_1^2 + 5.3P_1 + 500 \text{ Rs./hr}$$

$$C_2 = 0.006 P_2^2 + 5.5P_2 + 400 \text{ Rs./hr}$$

$$C_3 = 0.009 P_3^2 + 5.8P_3 + 200 \text{ Rs./hr}$$

Where,  $P_1$ ,  $P_2$  and  $P_3$  are power output in MW. Find the optimum load allocation and total cost when the total load is 800 MW.

3. Explain with block diagram the excitation system and its modelling with relevant transfer functions.
4. Draw the model of a D.C. link in power systems.
5. Develop linear model for a single area automatic load frequency (ALFC) control. Explain its static and dynamic response for a step input.
6. What are the various constraints in a unit commitment problem? Explain priority list method of unit commitment of thermal units using full load average production cost.

### SECTION-C

7. Derive the exact coordination equation for optimal operation of power systems with losses coordinated. Explain algorithm for iterative solution of economic dispatch.
8. What is hydrothermal scheduling? What is the main objective and constraints in case of hydrothermal scheduling? Explain the coordination equations and algorithm for optimal operation of hydro-thermal systems.
9. Write short note on the following:
- (A) Contingency analysis
  - (B) Solution Techniques of AC-DC power flow equations.
  - (C) Advantages and disadvantages of interconnected systems

**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.**