Sub Code:NEE031/NEN031

Paper Id: 120711 Roll No: | | | | | | | | | | | | | |

# B TECH
## (SEM VII) THEORY EXAMINATION 2019-20
## POWER SYSTEM OPERATION AND CONTROL

*Time: 3 Hours* *Total Marks: 100*

**Note:** Attempt all Sections. If require any missing data; then choose suitably.

## SECTION A

**1. Attempt *all* questions in brief. 2 x 10 = 20**

a. What are the functions of control center?
b. What is congestion?
c. What are the known and unknown in the different bus classifications?
d. What is advantage of FDLF method?
e. Define economic load dispatch.
f. What is single area?
g. What is a varistor?
h. What is static var compensator?
i. What is the necessity of compensation?
j. What is SCADA master unit?

## SECTION B

**2. Attempt any *three* of the following: 10x3=30**

a. Explain a typical power system from generation to distribution level with schematic diagram. What do you mean by level decomposition in power system networks?
b. Why load prediction is necessary in power system operation? Explain.
c. What is the objective in economic scheduling? Also drive the condition for optimal allocation of total load among units in a thermal station when losses are not neglected
d. Discuss the need and function of state estimation. Explain the difference between static state estimation and dynamic state estimation.
e. What are various types of FACTS devices?

## SECTION C

**3. Attempt any *one* part of the following: 10x1=10**

a. Explain the various level of hierarchy of operation in the power system.
b. Explain the overview of energy management system.

**4. Attempt any *one* part of the following: 10x1=10**

a. Compare the load flow problem and OPF problem.
b. Define input-output characteristics, heat rate and incremental cost.

**5. Attempt any *one* part of the following: 10x1=10**

a. Consider a steam station with two units the input - output characteristics being specified by

$$F_1 = 60 + 6P_1 + 0.012\,P_1^2 and F_2 = 110 + 6P_2 + 0.04\,P_2^2$$

In scheduling a load of 120 MW by equal incremental cost method, the incremental cost of unit 1 is specified wrongly by 15% more than the true value while that of unit 2 is specified by 6% less than the true value Find (i) The change in generation schedules and (ii) The change in the total cost of generation.

b. Draw and explain the block diagram of load frequency control of two area system. Also determine the steady state and dynamic response of two area system.

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**6. Attempt any *one* part of the following: 10x1=10**

a. What are the functions and requirements of the excitation system?

b. Explain how voltage and reactive power is controlled using suitable expression.

**7. Attempt any *one* part of the following: 10x1=10**

a. Write a short note on:

i. Shunt compensation
ii. Phase angle compensation
iii. Tap changing transformer

b. What do you mean by "load frequency control" in power system environments? Also mention its merit demerits. Develop the mathematical model of Turbine speed governing system.