USN |   |   |   |   |   |   |   |   |   |   |   |   | 　　　　　　　　　　**10EE82**

## Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
## Power System Operation and Control

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer FIVE full questions, selecting*
*at least TWO questions from each part.*

### PART – A

1　a.　What is a SCADA system? Draw and explain the functional block diagram of the dual computer configuration for control and monitoring of power system. **(10 Marks)**

　　b.　Derive the expression for tie-line power and frequency deviation for two area system. **(06 Marks)**

　　c.　Two areas A and B interconnected by tie-line. The generating capacity of area A is 25,000 MW and its regulating characteristic is 2.5% of capacity per 0.1 Hz. Area B has a generating capacity 5000 MW and its regulating characteristic is 1.5% of capacity per 0.1 Hz. Find each areas share of a 800 MW disturbance (load increase) occurring in area B and resulting tie-line flow. **(04 Marks)**

2　a.　What is the function of AVR? Explain with suitable block diagram, the mathematical modeling of AVR. **(10 Marks)**

　　b.　What is load frequency control? Obtain and explain the transfer function model of load frequency control for an isolated power system. **(10 Marks)**

3　a.　Write notes on basic generator control loops and cross coupling between control loops. **(05 Marks)**

　　b.　Determine the primary ALFC loop parameters for control area having the following data:
　　　　Total rated area capacity $P_r = 2000$ MW
　　　　Inertia constant 5.05, Frequency $f_0 = 60Hz$, Normal operating load $P_D = 1000$ MW **(05 Marks)**

　　c.　A single area consists of two generators with following parameters:
　　　　Generator – 1 = 1200 MVA, R = 6% (on machine base)
　　　　Generator – 2 = 1000 MVA, R = 4% (on machine base)
　　　　The units are sharing 1800 MW at nominal frequency of 50 Hz. Unit 1 supplies 1000 MW and unit 2 supplies 800 MW. The load is now increased by 200 MW. Choose a common base of 2000 MVA.
　　　　Find (i) Steady state frequency and generation of each unit if D = 0
　　　　　　 (ii) Repeat (i) if D = 1.5. **(10 Marks)**

4　a.　Explain different sources of reactive power generation and absorption of reactive power in a power system. **(08 Marks)**

　　b.　Derive the equations to get the relation between voltage, power and reactive power at a node. **(06 Marks)**

　　c.　Explain voltage instability and voltage collapse. **(06 Marks)**

## PART – B

5 a. Explain the problem of unit commitment. What are the constraints in solving the unit commitment problem? Explain each of it. **(10 Marks)**

   b. With the help of flow chart, explain the dynamic programming method in unit commitment problem. **(10 Marks)**

6 a. What is meant by power system security? Explain major functions involved in system security. Explain the factors affecting system security. **(10 Marks)**

   b. With the help of flow chart, explain the contingency selection procedure. **(10 Marks)**

7 a. Explain energy management system. **(10 Marks)**

   b. Explain the least square estimation method used in power system state estimation. **(10 Marks)**

8 a. Derive the steady-state reliability expression and general reliability expression. **(10 Marks)**

   b. With the help of flow chart, explain loss and load probability for planning of generating capacity. **(10 Marks)**

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**10EE836**

# Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
## Renewable Energy Sources

Time: 3 hrs.

Max. Marks:100

**Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.***

## PART – A

1   a. List the differences between Renewable and Non – renewable energy sources. **(08 Marks)**
    b. What are the advantages and limitations of renewable energy sources? **(06 Marks)**
    c. Explain in brief the availability of energy sources. **(06 Marks)**

2   a. With a neat diagram, explain Pyranometer used for measuring global radiation. **(08 Marks)**
    b. Define i) Solar constant   ii) Declination and   iii) Hour angle. **(06 Marks)**
    c. Determine the local solar time and declination at a location latitude $23^0$ 15′ N, Longitude $77^0$ 30′ E at 12.30 IST on June 19. Equation of time correction is given from a chart is –(1′ 0″). **(06 Marks)**

3   a. List the advantages and disadvantages of concentrating collector over flat plate collector. **(08 Marks)**
    b. Write short notes on any two of the following : **(12 Marks)**
       i) Solar water heater   ii) Solar Drier   iii) Solar furnaces   iv) Solar cookers.

4   a. With a neat diagram, explain solar water pumping system. **(06 Marks)**
    b. Explain the significance of solar energy storage. **(06 Marks)**
    c. Write short notes on : i) Solar pond and  ii) Solar photovoltaic. **(08 Marks)**

## PART – B

5   a. Derive an expression for Power in the wind. **(06 Marks)**
    b. With a block diagram, explain the basic components of wind energy conversion system. **(08 Marks)**
    c. List the advantages and disadvantages of wind energy conversion system. **(06 Marks)**

6   a. List and explain the factors affecting biodigestion. **(10 Marks)**
    b. With a neat diagram, explain the KVIC model biogas plant. **(10 Marks)**

7   a. With a neat diagram, explain the principle of ocean thermal energy conversion system. **(10 Marks)**
    b. With a neat diagram, explain the principle of tidal power generation. **(10 Marks)**

8   a. Explain the principle of energy generation using fuel cells. **(08 Marks)**
    b. Write short notes on : i) Hydrogen energy   ii) Wave energy. **(12 Marks)**

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# Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
## Electrical Power Quality

Time: 3 hrs.                                                                     Max. Marks:100

**Note:** *Answer any FIVE full questions, selecting*
*atleast TWO questions from each part.*

## PART – A

1   a. Define power quality? Explain the procedure to evaluate power quality.      **(07 Marks)**
    b. Define waveform distortion? Briefly discuss the various types of waveform distortion.
                                                                                 **(08 Marks)**
    c. Draw and explain CBEMA curve.                                             **(05 Marks)**

2   a. With a neat diagram, explain the fundamental principles of protection in voltage sag.
                                                                                 **(07 Marks)**
    b. Discuss the term 'Area of Vulnerability'.                                 **(07 Marks)**
    c. Describe briefly any one method used to mitigate voltage sags.            **(06 Marks)**

3   a. Explain how lightning can cause transient over voltage.                   **(10 Marks)**
    b. Explain with a neat diagram, fundamental principle of over voltage protection.  **(10 Marks)**

4   a. Describe the two standard harmonic indices used to measure the harmonic content and a
       waveform.                                                                 **(10 Marks)**
    b. Explain how commercial load like fluorescent lighting can cause the harmonics.   **(10 Marks)**
    c. Name the different impacts of harmonic distribution on various power system components.

## PART – B

5   a. With a neat flow diagram, explain the voltage limit evaluation procedure.  **(10 Marks)**
    b. Explain briefly how in line reactors or chokes devices are used for controlling harmonic
       distribution.                                                             **(10 Marks)**

6   a. Explain the power quality planning process and their PQ cost in planning process. **(10 Marks)**
    b. Explain typical steps in the power quality bench marking process.         **(10 Marks)**

7   a. Explain the various power quality issues affected by distributed generation.  **(10 Marks)**
    b. Explain DG. Explain briefly any four types of DG technologies.            **(10 Marks)**

8   a. Explain basic design of an export system for monitoring application.      **(10 Marks)**
    b. What are the objectives of PQ monitoring?                                 **(05 Marks)**
    c. Write a short note on disturbance analyzer.                               **(05 Marks)**

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