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10EE82

Eighth Semester B.E. Degree Examination, June/July 2018
Power System Operation and Control

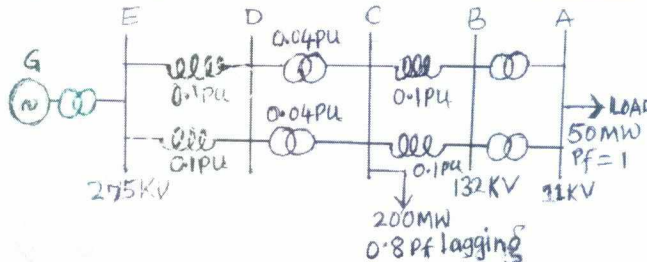
Time: 3 hrs.

Max. Marks: 100

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

PART – A

1. a. Explain the role of Automatic Generation Control (AGC) in a power system. (04 Marks)
 b. Explain the operation of Isolated power system without AGC or Central computers. (08 Marks)
 c. Explain the parallel operation of two units of different capacity and regulation characteristics. (08 Marks)
2. a. Two areas A and D are interconnected with system frequency 50Hz, generating capacity of A is 36,000 MW with regulating characteristics of 1.5% per 0.1Hz and B has generating capacity of 4000 MW with regulating characteristics of 1% per 0.1Hz. For a + 400 MW disturbance (load increase) is occurring in area D. Determine (08 Marks)
 - i) Change in frequency and steady state frequency after the disturbance.
 - ii) Tie line power and each area's share for disturbance.
 - iii) Change in frequency and actual steady state frequency after the disturbance, if area D is not interconnected.
 - iv) Repeat (a), (b) and (c) for -400MW disturbance (load decrease) occurring in area D.
- b. Obtain the open loop model of an automatic load frequency control of single area isolated power system. (12 Marks)
3. a. Draw the model for two area system interconnected through weak tie line and obtain the equation for static frequency drop the tie line power by applying static frequency response. (10 Marks)
 b. A two area system has following data
 Area A, Rated capacity = 500 MW , Speed regulation = 2.5Hz/Pu MW ;
 Area B, Rated capacity = 2000MW ; Speed regulation = 2Hz/Pu MW.
 In each area 1% change in load occurs for 1% change in frequency. Find the steady state change in frequency and change in tie line power if 20MW of load changes in
 i) Area A and ii) Area B. (10 Marks)
4. a. Show that real power flow between two nodes is determined by the transmission angle 'δ' and the reactive power flow is determined by the scalar voltage difference between the nodes. (10 Marks)
 b. In the radial transmission system shown figure Q.4(b) below, all p.u values are referred to the voltage bases shown and 100 MVA. Determine the power factor at which the generator must operate. Neglect I² X losses in generator transformer. (10 Marks)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. Obtain the coordination equation for optimum loading of thermal power plants neglecting generation limits and losses. (07 Marks)
b. Explain the thermal constraints and must run constraints in unit commitment. (06 Marks)
c. Explain Spinning reserve and its allocation criteria. (07 Marks)
- 6 a. What do you understand by “Secured power system” and “Power system black out”? (04 Marks)
b. Explain about three basic ways to obtain quicker power system security analysis study. (06 Marks)
c. Explain the DC load flow method for contingency analysis using linear sensitivity factors with relevant flow charts. (10 Marks)
- 7 a. Explain the hierarchy control of a power system with Energy Management System. (07 Marks)
b. Explain errors and detection in Power System State Estimation (PSSE). (06 Marks)
c. Explain about different operating states of a power system. (07 Marks)
- 8 a. Define Reliability of a system. (02 Marks)
b. Explain three modes of failure of a system. (08 Marks)
c. Obtain the expression for steady state reliability and General reliability function. (10 Marks)

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10EE836

Eighth Semester B.E. Degree Examination, June/July 2018
Renewable Energy Sources

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What are the advantages and limitations of renewable energy sources? Explain in details about the prospects on 'Non-conventional' energy sources in India. (10 Marks)
- b. Explain the significance of energy consumption as prosperity. Write the different types of energy sources with examples. (10 Marks)
- 2 a. Define the following angles i) zenith ii) solar azimuth iii) incident. (10 Marks)
- b. Differentiate between pyrheliometer and pyranometer. Explain in details about the working principle of Angstrom pyrheliometer with a suitable sketch. (10 Marks)
- 3 a. State the advantages and limitations of concentrated collector over the flat plate collector. (10 Marks)
- b. With a neat diagram explain the working of a solar cooker. (10 Marks)
- 4 a. Explain the principle of working of solar photovoltaic power generation, with a neat sketch. (10 Marks)
- b. With a neat sketch explain the principle of working of a 'solar water pumping system'. (10 Marks)

PART – B

- 5 a. With a suitable block diagram, explain the functions of different components of Wind Energy Conversion System (WECS). (10 Marks)
- b. State and briefly explain the factors that determine the output power from wind energy. (10 Marks)
- 6 a. Write the various factors those are affecting the generation of biogas. Name the different models of biogas plants in India. (10 Marks)
- b. With a suitable, explain the working of Janata Model Biogas Plant. (10 Marks)
- 7 a. With a suitable diagram, explain open cycle OTEC (Ocean Thermal Energy Conversion) system for ocean thermal energy development. (10 Marks)
- b. Explain the working of single basin tidal power plant. (10 Marks)
- 8 a. Describe the fuel cells and brief about its functions. (10 Marks)
- b. Write a note on wave energy conversion system with a suitable sketch. (10 Marks)

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10EE847

Eighth Semester B.E. Degree Examination, June/July 2018
Electrical Power Quality

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. List the principal phenomena causing electromagnetic disturbances classified by the International Electrotechnical Commission (IEC) (08 Marks)
- b. Is power quality = Voltage Quality? Explain it in brief with respect to practical power system. (04 Marks)
- c. Explain in brief the types of waveform distortions. (08 Marks)
- 2 a. Estimate voltage sag performance between supply system characteristics and facility operation. Also explain area of vulnerability concept. (08 Marks)
- b. With neat sketch explain the approaches for voltage sag ride-through capability for a sensitive process machine that leads to cost effective solution. (07 Marks)
- c. Draw the characteristics of a typical motor starting voltage sag and estimate the sag severity during full voltage starting with 90% of nominal voltage. Also state the requirements for simulation. (05 Marks)
- 3 a. With simple series RLC circuit, explain how Ferro-resonance becomes a source of transient over voltage. Also discuss the graphical solutions for linear and non-linear LC circuit. (10 Marks)
- b. With neat sketch list and explain the fundamental principles of over voltage protection of a load equipment. (10 Marks)
- 4 a. With suitable example, explain how harmonic distortion is caused by non-linear devices in power system? Also explain the concept of Fourier series in analyzing harmonic distortion. (08 Marks)
- b. With relevant waveform and harmonic spectrum, explain how fluorescent light acts as a harmonic source. (06 Marks)
- c. Define and explain Interharmonics with respect to modern induction furnace. (06 Marks)

PART – B

- 5 a. With flow chart, explain the voltage limit evaluation procedure of a utility system. (08 Marks)
- b. In brief, explain about the devices used in controlling harmonic distortion. (08 Marks)
- c. What are the parts of International Electro-technical Commission (IEC) Standards on harmonics? (04 Marks)
- 6 a. Explain the process involved in power quality bench marking. (07 Marks)
- b. Make a descriptive analysis of a power quality state estimation. (07 Marks)
- c. Explain the process of including power quality in distribution planning. (06 Marks)
- 7 a. What is meant by distributed generation? Mention some disadvantages of it. (04 Marks)
- b. Explain in brief about DG technologies. (08 Marks)
- c. In detail, explain the power quality issues in power system affected by distributed generation. (08 Marks)
- 8 a. List the types of power quality measuring instruments and explain any two types in brief. (08 Marks)
- b. Write a short note on any two from the following (12 Marks)
 - i) What is power quality and why we are concerned about it?
 - ii) CBEMA and ITI Curves
 - iii) THD and TDD
 - iv) Passive Filters.

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Eighth Semester B.E. Degree Examination, June/July 2018
Energy Auditing and Demand Side Management

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. Explain the energy consumption and discuss how the energy conservation is achieved using different strategies. (10 Marks)
- b. Describe the three pronged approach for energy management in an industry. (06 Marks)
- c. Write a short note on distribution codes. (04 Marks)
- 2 a. What is time value money concept? Explain in brief. (04 Marks)
- b. Explain the following methods to determine the depreciation :
i) Sinking fund method ii) Sum of year digit method. (08 Marks)
- c. An amount of Rs. 10000/- is accumulated in an account. The credit card company charges 14% nominal annual interest compounded monthly. Only Rs. 200/- can be affordable to pay per month. How many months will it take to pay off and how much money is being paid as an interest? (08 Marks)
- 3 a. Define the energy audit and list its objectives. (06 Marks)
- b. Describe the energy use profiles with neat relevant diagrams. (08 Marks)
- c. Explain the energy audit in the following systems :
i) Illumination system ii) heating, ventilation and air cooling (HVAC) system. (06 Marks)
- 4 a. Explain the power triangle also explain the significance of horse power in brief. (04 Marks)
- b. With neat single line diagram explain the power flow concept. (10 Marks)
- c. Describe the electrical system optimization. (06 Marks)

PART – B

- 5 a. Explain the causes of low power factor and also mention the effects of low power factor. (06 Marks)
- b. Describe the location of capacitor bank for the power factor improvement with neat relevant diagram. (08 Marks)
- c. A three phase, 415volts, 50Hz, 5KW induction motor has pf of 0.75 lagging. A bank of capacitors is connected in delta across the supply terminals, and pf is raised to 0.9 lagging. Determine the KVAR rating of the capacitor bank in each phase. (06 Marks)
- 6 a. What is the lighting basics? Explain the Lumen method for illumination design. (06 Marks)
- b. Describe the energy efficient motors with neat relevant diagrams and also mention its design improvements adopted. (08 Marks)
- c. Calculate the annual bill a of a consumer, whose maximum demand is 150KW, power factor 0.85 lagging and load factor is 70%. The tariff is Rs 85/- per KVA of maximum demand plus paisa 25/- per KWh consumed. (06 Marks)
- 7 a. Explain the three different types of load control techniques used for load management. (06 Marks)
- b. Describe the three different types of tariff option available for DSM programme. (06 Marks)
- c. Discuss the energy conservation opportunities in agriculture and illumination sector. (08 Marks)
- 8 a. Describe any five energy efficient equipment. (10 Marks)
- b. With a neat block diagram, explain the division level management and organization of energy conservation awareness programme. (10 Marks)

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