

Title: Renewable Energy Systems

Code: EPM625

Level: 600

Date: 5-6-2016

Allowed time: 3 hr

No. of Pages: (1)

Problem number (1) (24 Marks)

- 1-a) Discuss the different applications of fuel cells and highlight the relation between the characteristics of each type with the suitable application. (8)
- 1-b) Compare between different types of geothermal power plants including: dry steam power plants, flash steam power plants and binary-cycle power plants (8)
- 1-c) Mention the advantages and disadvantages of geothermal energy (8)

Problem number (2) (24 Marks)

- 2-a) What are the main applications of biomass. (8)
- 2-b) Describe the basics of Solar Power Tower Systems for thermal energy generation from solar. (8)
- 2-c) Sketch the equivalent circuit of photovoltaic system and explain the meaning of each element in the equivalent circuit. (8)

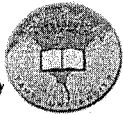
Problem number (3) (22 Marks)

- 3-a) Define the Wave Dragon System used to extract ocean wave energy. (8)
- 3-b) Discuss the principles of maximum power tracking in wind energy system. (8)
- 3-c) Describe the main parts of horizontal-axis wind turbine? (8)

Good Luck

Course Coordinator: Dr. Ahmed Refaat Azmy

Dr. Daaa Mansour



Course Title: Control in Power System
Date: 9 June 2016

Year: Postgraduate
Total Marks: 70 Marks

Allowed time: 3 hrs
code EPM 617

Answer all the following questions

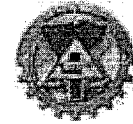
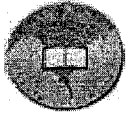
Question 1 (30 marks)

- a) Explain why the voltage and the frequency must be constant during normal operation of power system. (5 marks)
- b) Explain how the isochronous governor could control the speed of one unit of synchronous generator. Draw the block diagram which describes this system. (10 marks)
- c) Write short notes about the objectives of AGC, showing how it could be used in isolated power system and in interconnected power systems. (5 marks)
- d) What is the role of automatic voltage regulator in the power system, clarify the limitations of using this technique. (5 marks)
- e) Clarify how the battery energy storage system participates in improving the performance of photovoltaic-grid connected system. (5 marks)

Question 2 (40 marks)

- (a) Various problems in power system could be solved by the unified power flow controller UPFC. Based on this sentence, explain its construction, function, advantages and disadvantages. (15 marks)
- (b) Several means of FACTS are implemented in the power system, mention these systems and define the function of each system. (15 marks)
- (c) One of the most parameter in energy storage system is the battery state of charge, define this parameter and discuss the different techniques used to determine it practically. (10 marks)

**Best wishes,
Dr. Doaa Mokhtar & committee**



Course Title: Digital Protection
Date: June 2016

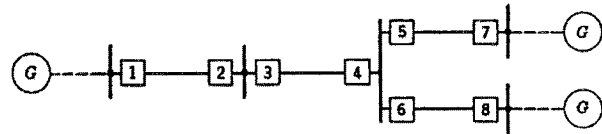
Course Code: EPM520
Allowed time: 3 hrs

Answer the following questions

Problem number (1) (30 Marks)

- Define the Power System Protection? And explain the fault detection methods?
- Aiding with simple drawing, Explain briefly the protection system elements?
- Explain three advantages and three drawback achieved by using microprocessor-based relays?
- Most of digital relays have a typical construction, Explain this phrase?
- Classify the protective relays from their function point of view?
- Give an example to show the locations of the CTs with respect to the dead and life tank circuit breakers for two overlapping unit protection.
- The portion of a power system shown by the one-line diagram in the following figure, with generating sources back of all three ends, has conventional primary and back-up relaying. In each of the listed cases, a short circuit has occurred and certain circuit breakers have tripped as stated. Assume that the tripping of these breakers was correct under the circumstances. Where was the short circuit? Was there any failure of the protective relaying, including breakers, and if so, what failed? Assume only one failure at a time. Draw a sketch showing the overlapping of primary protective zones and the exact locations of the various faults.

Case	Breakers Tripped
A	1,2
B	3, 5, 6
C	4, 5, 8
D	3, 4, 5, 6



Problem number (2) (20 Marks)

- State the multiple process used for signal sampling process?
- Define the aliasing and state how can be avoided?
- A time waveform of a function $v(t) = 80 \sin(2\pi \times 50t) + 20 \sin(2\pi \times 150t - 90)$, if it is sampled using 400 Hz. Determine the RMS value of $v(t)$ using recursive method?

Problem number (3) (20 Marks)

- Using non-recursive DFT technique to estimate the fundamental phasor of the following samples:

k	0	1	2	3	4	5	6	7
v_k	-90.40	-85.99	-70.87	-14.86	90.29	86.05	70.89	15.09

k is the sampling number; v_k is the waveform value at sample k. (sampling rate is 8 S/C)

- Using the recursive DFT technique to estimate the third-harmonic phasor of the following function:
 $v(t) = 100 \cos(2\pi ft - 90) + 20 \cos(10\pi ft - 45)$
If the sampling frequency is 400 Hz and power frequency is 50 Hz. Applying on the first cycle?

Good Luck

Course Examination Committee: Dr. Mohamed Abo Elazm



قسم هندسة القوى والآلات الكهربائية



كلية الهندسة

جامعة طنطا

Subject: Fault Diagnosis of Electrical Power Equipment	Code: EPM530	No. of. Hours: 3
Date: 5/6/2016	Degrees: 70	No. of Pages: 1

Question 1 (28 Marks):

- Mention the main objectives of condition monitoring and diagnosis. Then, compare between off-line and on-line diagnosis. (7 Marks)
- Describe the procedures of insulation polarization spectrum test in power transformers. Then, explain how it can be used in assessing the aging condition. (7 Marks)
- Explain the different methods of DGA in power transformers. (7 Marks)
- Mention the main factors affecting UHF diagnosis in GIS. (7 Marks)

Question 2 (28 Marks):

- Explain pulse sequence analysis of partial discharge using $\Delta u/\Delta \Phi$ pattern. Then, describe how it can be used in fault diagnosis in GIS. (9 Marks)
- Compare between cable testing using DC, normal frequency AC, and very low frequency AC highlighting the advantage and disadvantage of each method. (10 Marks)
- Explain the impact of aging in outdoor insulation on leakage current. (9 Marks)

Question 3 (14 Marks):

- Write short note about
 - Types of Stator Winding Construction
 - Stator Winding Insulation
 - The failure processes of electrical machines
- Numerate the factors affecting failure mechanism predominance. Give simple explanation of two of these factors.
- Explain the thermal deterioration as a common reason of winding failure and its symptoms for air cored machines.
- Differentiate testing and monitoring processes. Numerate the reasons of applying them in electrical machine systems.

Examination Committee: Dr. Diao-Eldin Mansour and Dr. Mohamed Elnemr