Menoufiya University
Faculty of Engineering
Shebin El-Kom
First Semester Examination
FourthYear   2013-2014

Department: Electrical
Subject: Automatic control system
Time Allowed: 3 hours
Date:20/ 1/ 2014
Max: 100 Marks

QUESTION(1)   (25 Marks)

The peak load and different categories of energy consumption in an area are tabulated below:

Year	2004	2005	2006	2007	2008
Peak load (MW)	430.1	427.16	364.2	436.0	460.6
Industrial Energy (MWH)	906310	889330	884730	1017030	1363850
Traction Energy (MWH)	229440	230660	199760	225940	260690
Domestic Energy (MWH)	57720	60240	68280	89880	119730
Commercial Energy (MWH)	49470	53480	62770	81770	103760

1-Using Extrapolation method project the load up to 2013.

2-Using the End-Use method predict the energy and peak load up to 2013.

   (use the function $Y = a + b x + c x^2$)

   Are the two methods obtain the same peak loads? If not tell why?

QUESTION(2)   (20 Marks)

A- What is meant by:

   Diversity factor   – Firm power   – Cold reserve   – Hot reserve
   - automated expansion of transmission lines.

B- Mention some advantages of having load dispatch center

C-A power station has required to supply four loads with peak demands of 320 MW, 550 MW, 450 MW and 600 MW. If the load factor and the diversity Factor are 0.5 and 1.6 respectively calculate:

   I- The maximum demand of the station   II- The annual supplied energy

III- Suggest the type of the required power station

IV-Suggest the number and the size of its units and the required stand by unit(s)

V- If you have an empty area of 150000 m^2 beside the station , what is the capacity of a new generating unit you can install.

## QUESTION(3)   (25 Marks)

A. Compare between Thermal, Nuclear and hydro-electric power stations in terms of: site selection, advantages, disadvantages and tariff equations.

B. A generating station has two generators of 20 MVA and 30 MVA respectively and percentage reactances of 8 and 10 respectively. The circuit breakers are rated at 450 MVA. Due to increase in load it is intended to extend the system by adding a 20 MVA transformer of 10 % reactance. If the system voltage is 132 KV. What is the value of reactance to protect the switchgear.

QUESTION(4)   (30 Marks)

A. Mention the civil and electrical steps of substation construction and discuss briefly the considerations which kept in view while finalizing the layout of the substation.

B. Discuss briefly each of the following:
   -Power system security   – Security control
   – SCADA system and its main   component

C. For the network shown in figure, using Tellegen's theorem,
   I-Calculate the sensitivity of V_o with respect to Y_1, Y_2, Y_3 and Y_o.
   II- Obtain the ad joint network.
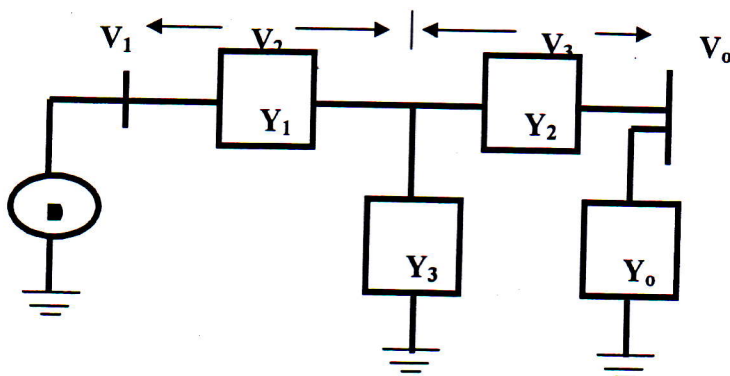
Good luck   *Prof.Dr/ Gamal A. Morsy*

National Academic Reference Standard(NARS)				
General Skills	Professional Skills	Intellectual Skills	&Knowledge Understanding	Field
	C1, C17	B7, B13	A13, A14	Program Academic Standards that the course contribute in achieving
	3 and 4	1 and 2	1 and 2	.Question No