

المادة : تخطيط نظم القوى الكهربائية

2016/1/ 17



جامعة المنوفية

الزمن : 3 ساعات

مقرر اختياري 5

كلية الهندسة بشبين الكوم

الفرقة : الرابعة

قسم الهندسة الكهربائية

[1] The load factor and different categories of energy consumption in an area are tabulated below:

Year	2007	2008	2009	2010	2011
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
Load Factor %	32.99	32.97	38.1	37.04	45.8

1-Using Extrapolation method project the load up to 2015.

2- Using the End-Use method predict the energy and peak load up to 2015. (use the function  $Y = a + bx + cx^2$ )

Comment on the results.

[25 Marks]

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

B. Mention the factors taken into consideration when choosing an overhead lines conductor materials. What is the most used types.

C. There are four industrial loads with peak demands of 250 MW, 350 MW, 200 MW and 400 MW respectively. It is required to supply these loads from a new power station , with a diversity factor of 1.65 and a load factor of 0.6. Then:

I- Suggest the type of the required power station

II-Suggest the number and the size of the generating units in the power station. As well as the required stand by unit(s)

Calculate

III- The installed capacity of the station

IV- The annual supplied energy

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

[25 Marks]

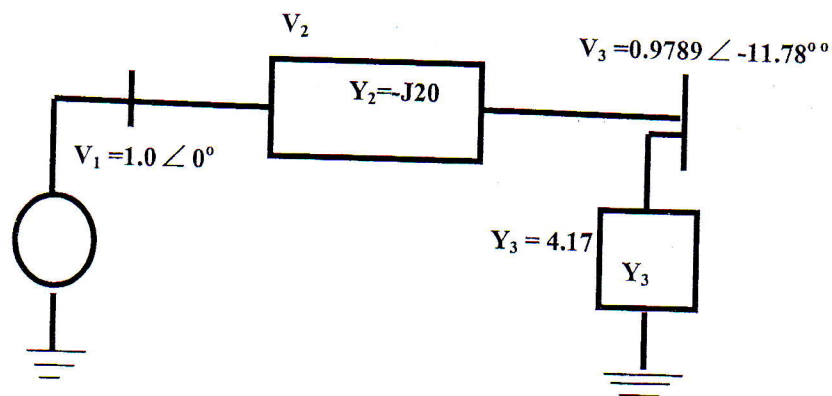
- [3] A. Discuss how you can choose  
i-generation voltages.                      ii - Current limiting reactors locations  
iii-transmission voltage and discuss its effect on conductors volume
- B. Mention the civil and electrical steps of substation construction and discuss briefly the considerations which kept in view while finalizing the layout of the substation.
- C. Four generators are connected to a common tie bar through equal reactors in a tie system. Each generator is rated at 30 MVA, 3 phase, 50 c/s, 11 KV and has 20 % reactance. When one of the section bus bars is short circuited, the voltage on the remaining reactors becomes 60 % of normal value. Calculate the inductance of each reactor .
- [25 Marks]

[4] A. What is meant by automated expansion of transmission lines.  
Discuss the reasons for new transmission expansion.

B. Discuss briefly each of the following:

- Power system security                      - Security control
- SCADA system and its main component.

C. For the network shown in the figure, using Tellegen's theorem ,  
I- Calculate the sensitivity of  $V_3$  with respect to changes in  $Y_2$  and  $Y_3$  .  
II- Obtain the adjoint network.



[25 Marks]

Good luck

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