

نقل ونفذ مع الامتحان

Kafrelsheikh University
Faculty of Engineering
Department: Electrical Engineering
Electrical Power and Machines Engineering
Programme.
Course Title: Transmission and distribution
of electrical energy.



Date: SUN., 24- 12- 2017
Time Allowed: 3 hr
Full Mark: 90 Marks
Final term Exam: 1st Term.
Year: 3rd /2017-2018.

This exam measures the following ILOs: (a.3&a.15) - (b.2&b13) - (c.3&c16) - (d.1&d7)

- Trust in God -Be confident -Be calm.----- Exam is not a punishment or a curse.
- It is a chance to show your knowledge.---It is the time to get the prize of your effort.

Important instructions for all students: please read carefully

- The examination consists of 4 questions in 1 paper (2 pages)
- Read the questions carefully before answering.
- Your answer should be short and precise.
- Remember to mark your answers with ordered numbers corresponding to questions.

Answer the Following Question:

Question (1):

(25 Marks)

- The present trend is towards A.C for generation & distribution and D.C for transmission. **Discuss** the reasons for it. (4 Marks)
- Is sag a necessity in mechanical design of transmission line or an evil? **Discuss** (4 Marks)
- Will** capacitance of a transmission line depend upon the ground effect. (3 Marks)
- Load power factor effect on regulation and efficiency of transmission line **demonstrate** that. (3 Marks)
- A long transmission line is open circuited at end R. **Will** there be any current in the line at the end S? **Explain** your answer. (5 Marks)
- Under operating conditions, **the maximum stress in underground** cable is at..... (3 Marks)
- Describe** briefly some commonly used insulating materials for cables. (3 Marks)

Question (2):

(20 Marks)

- The insulators should have some desirable properties. **Demonstrate** it from your course. (5 Marks)
- Discuss:** methods of improving string of insulator efficiency (5 Marks)
- An overhead transmission line conductor having a parabolic configuration weights 1.925 kg per meter of length. The area of X-section of the conductor is 2.2 cm^2 and the ultimate strength is 8000 kg/cm^2 . The supports are 600 m apart having 15m difference of levels. **Calculate** the sag from the taller of the two supports which must be allowed so that the factor of safety shall be 5. **Assume** that ice load is 1 kg per meter run and there is no wind pressure. (10 Marks)

Question (3):

(20 Marks)

- a) **What** do you understand by generalized circuit constants of a transmission line? **What** is their importance? **(5 Marks)**
- b) **Why** transmission lines are 3 phase 3 wire circuits while distribution lines are 3 phase 4 wire circuits? **(5 Marks)**
- c) A 3-phase load of 2000 kVA, 0.8 p.f. is supplied at 6.6 kV, 50Hz by means of a 33kV, transmission line 20 km long and 33/6.6 kV step-down transformer. The resistance and reactance of each conductor are 0.4Ω and 0.5Ω per km respectively. The resistance and reactance of transformer primary are 7.5Ω and 13.2Ω while those of secondary are 0.35Ω and 0.65Ω respectively. **Find** the voltage necessary at the sending end of transmission line when 6.6 kV is maintained at the receiving end. **Determine** also the sending end power factor and transmission efficiency. **(10 Marks)**
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Question (4):

(25 Marks)

- a) **What** is end condenser method of medium lines? **Derive** expression for parameters of this circuit in terms of line parameters. **Demonstrate** your answer with net graph. **(6 Marks)**
- b) **How** does the insulation resistance of a cable vary with its length? **(4 Marks)**
- c) A sub-station supplies power at 11kV, 0.8 p.f lagging to a consumer through a single phase transmission line having total resistance of 0.15 ohm. the voltage drop in the line is 15%. If the same power is to be supplied to the consumer by two wire D.C system by a new line having a total resistance of 0.05 ohm and if allowable voltage drop is 25%. **Calculate** the D.C supply voltage. If the consumer get any benefits **Show that**. **(15 Marks)**
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*With my best wishes
Dr. Eman Saad*