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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR

MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION

SEPTEMBER 2014 SESSION

SUBJECT CODE	:	**FEB 24033**
SUBJECT TITLE	:	**ELECTRICAL POWER**
LEVEL	:	**BACHELOR**
DURATION	:	**2.5 HOURS**
DATE / TIME	:	

INSTRUCTIONS TO CANDIDATES

1. **Please read the instructions given in the question paper CAREFULLY.**
2. **This question paper is printed on both sides of the paper.**
3. **Please write your answers on the answer booklet provided.**
4. **Answer should be written in blue or black ink except for sketching, graphic and illustration.**
5. **This question paper consists of TWO(2) sections. Section A and B. Answer all question in Section A. For Section B answer TWO(2) question only.**
6. **Answer all questions inEnglish.**

THERE ARE 4 PRINTED PAGES OF QUESTIONS

SECTION A(Total Marks: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

a) Define the meaning of per-unit system briefly. Give example if necessary

(5 marks)

b) Describe the advantages per-unit system used in electrical power?

(5 marks)

c) The schematic diagram of a radial transmission line is shown in Figure 1.0. The ratings and reactance of the various components are as shown along with the nominal transformer line voltages. A load of 50 MW at 0.8 PF lagging is taken from a 33 kV substation which is to be maintained at 30 kV. Calculate the terminal voltage of the synchronous machines. The line and transformers are represented by series reactance and the system is three-phase.

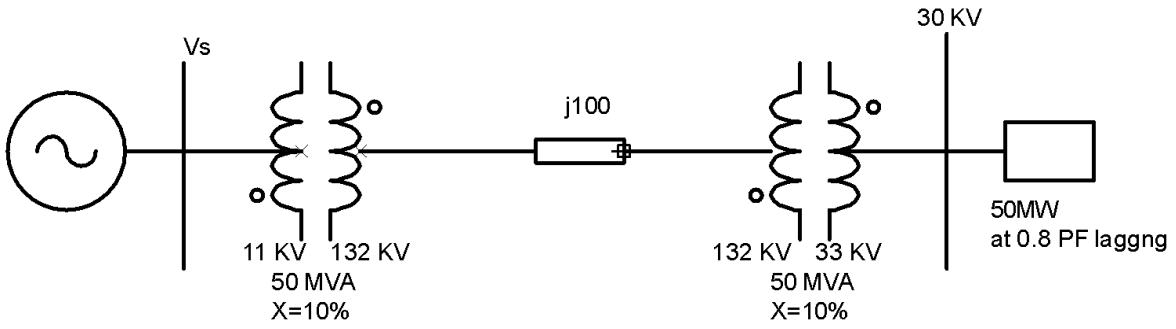

Figure 1.0

(10 marks)

Question 2

a) Lists the advantages of the multiphase systems in electrical power.

(5 marks)

b) List all the component of power available in three-phase electrical power systems?

(5 marks)

c) A transmission link shown in Figure 2.0 connects an infinite busbar supply of 400KV to a load busbar supplying 1000MW, 400 MVAr. The link consists of lines of effective impedance 7 + j70 Ω feeding the load busbar via transformer with a maximum tap ratio of 0.9:1. Connected to the load busbar is a synchronous compensator. If the maximum overall voltage drop is to be 10% with the transformer tap is fully utilized, calculate the reactive power requirement from the compensator.

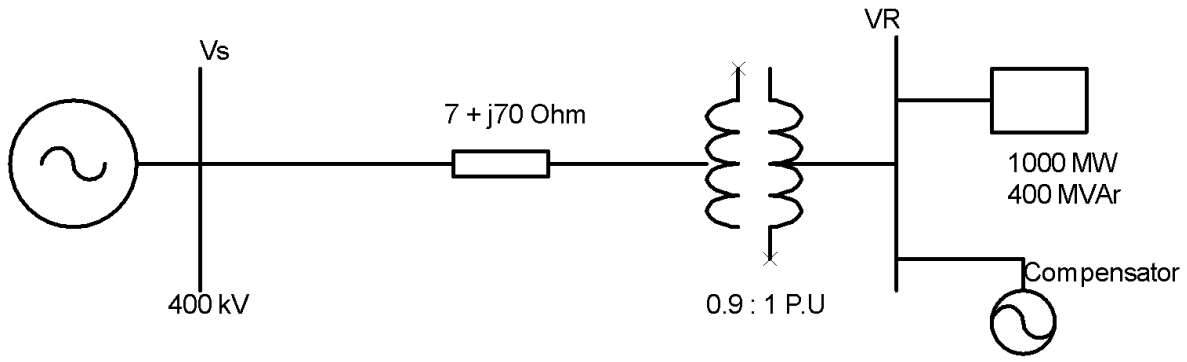

Figure 2.0

(10 marks)

Question 3

a) Classified the transmission lines category and explain in detail on each of them.

(5 marks)

b) List with the help of diagram the common types of fault existing in electrical power system.

(5 marks)

c) A three phase overhead line has a series of 5+j25 Ω and negligible shunt admittance. The load at the receiving end is 15 MW with 0.8 PF lagging at 33 kV. Find the capacity of the compensation needed to deliver this with a sending end voltage of 33 kV.

(10 marks)

SECTION B(Total Marks: 40 marks)

INSTRUCTION: Answer TWO(2) questios only.

Question 4 (20 Marks)

A 50 Hz 275 kV 3-phase transmission line with length 100 KM is rated at 800 A. The line resistance Inductance and Capacitance per phase are 0.078 Ω, 1.506 mH and 0.029 μF respectively. The receiving end voltage is 275 kV when 800 A is transmitted at 0.9 power factor lagging. Calculate the sending end voltage and current transmission efficiency. State all your assumption

Question 5 (20 Marks)

A synchronous machine A generating 1 P.U voltage is connected through a star-star transformer, reactance 0.12 pu to two lines in parallel. The other ends of the lines are connected through a star-star transformer of reactance 0.1 P.U to a second machine B, also generating 1 P.U voltages shown in Figure 3.0 . For both transformer X1=X2=X0. Calculate the current fed into a double line to earth fault on the line-side terminals of the transformer fed from A. The relevant per unit reactance of the plant all referred to the same base are as follows.

	X1	X2	X0
A	0.3	0.2	0.05
B	0.25	0.15	0.03

For each line X1=X2=0.3 and X0=0.7. The star points of machine A and of the two transformers are solidly earthed.

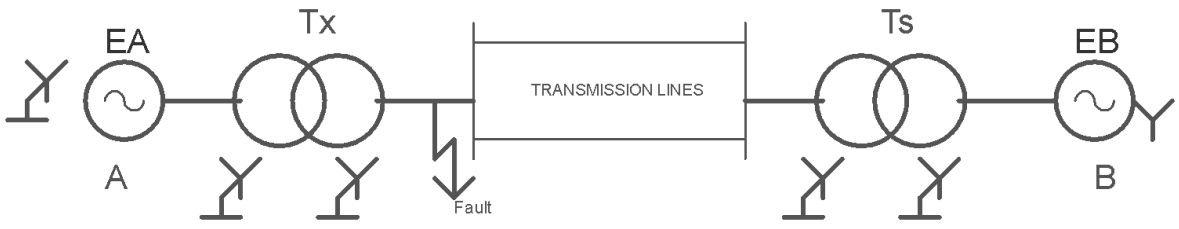

Figure 3.0

Question 6 (20 Marks)

Calculate the A B C D constant for 275 kV overhead line of length 83 KM. The parameter per kilometer are as follows:

Resistances: 0.078 Ω

Reactance: 0.33 Ω

Admittance (Shunt capacitive): 9.55×10^{-6} mhos

If the receiving-end voltage is to be 132 kV when supplying load of 125 MVA at 0.9 PF lagging, calculate the sending-end voltage and sending-end current.

Question 7 (20 Marks)

The equivalent of the single network of generator and line reactance is as in Figure 4.0. A three phase fault occurs at point F. Calculate the fault MVA at point F. The PU values for the reactance as refer to MVA base is 100 MVA. Resistances may be neglected.

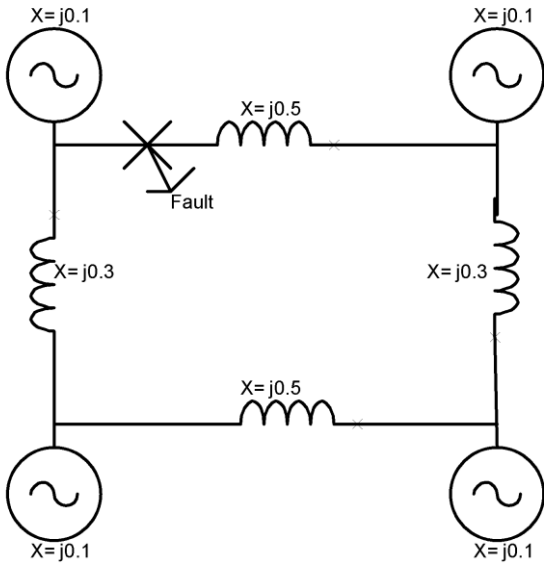

Figure 4.0

END OF QUESTION