

Comprehensive Exam (Closed Book)

EEE UC462 – Advanced Power Systems

Max Marks 40

Time: Three Hours

Answer all questions

Q1 a) What is the special feature of two part tariff? For which category of consumer is it used? Discuss the importance of encouraging customer to use electricity during off peak hours. (3)

b) Compute the generation cost per kwh from the following data:

- Installed capacity = 200 MW
- Capital cost= Rs 3000 per kw,
- Interest and depreciation = 12%
- Fuel consumption = 0.9 kg/ kwh
- Fuel cost = Rs 70 per 1000 kg
- Other operating cost = 30% of fuel cost
- Load factor= 80 %
- Peak load= 170 MW

(5)

Q2 a) 3 phase generators G1, G2 supply motor loads M1, M2 and M3 as shown in the figure 1. Transformers T1 and T2 are rated at 100 MVA and 33 / 110 KV, and each has a reactance of 0.08 per unit. Assuming 100 MVA and 33 KV are used as base values, obtain all the reactances as per unit values. (5)

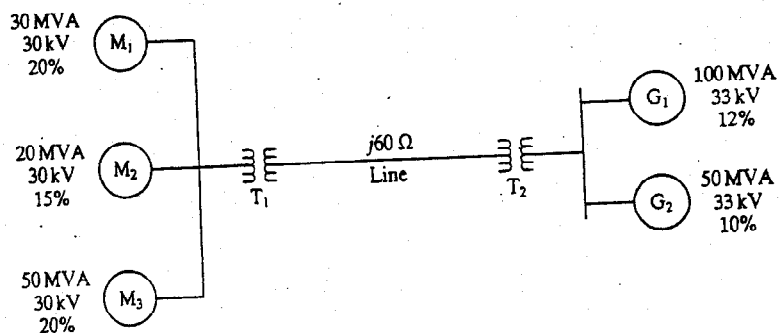


Figure 1

b) Define skin effect. Explain why transposition of conductor is done in overhead lines. (3)

Q3a) A delta connected resistive load is connected across a balanced three phase supply of 400 V as shown in figure 2. Find the symmetrical components of line currents and delta currents. (4)

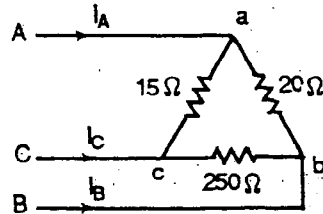


Figure 2

b) Discuss current chopping phenomena taking place in circuit breakers. In a short circuit test on a circuit breaker the following readings were obtained on single frequency transient.

- i) time to reach the peak re-striking voltage 50 micro second
- ii) the peak re-striking voltage 100 kv

Determine the average RRRV and frequency of oscillations (4)

Q4 a) A balanced load of 50 MW at .8 power factor lagging is supplied at 132 kV, 50 Hz by means of a transmission line. The series impedance of a single conductor is $(20 + j 50)$ ohms, and the total phase-neutral admittance is 300 micro-siemens. Using the nominal T approximation, calculate the sending end voltage. If the load is removed and the sending end voltage remains constant find the percentage rise in voltage at the receiving end (5)

b) Write the advantages and disadvantages of different types of Non conventional alternative energy sources. (3)

Q5 a) Why the future of nuclear power generation is considered bright? What is the purpose of moderator in a nuclear power station? With the help of a neat sketch show different parts of nuclear reactor. (4)

b) b) A star connected 3 phase 10 MVA, 6.6 kV alternator has a per phase reactance of 10%. It is protected by differential protective scheme which is set to operate for fault current not less than 175 A. Calculate the value of earthling resistance to be provided in order to ensure that only 10% of the alternator winding remains unprotected. (4)

BITS, Pilani –Dubai Campus, Knowledge Village, Dubai
 Second Semester 2004-2005 IVth Year- EEE

Test-II (Open Book)

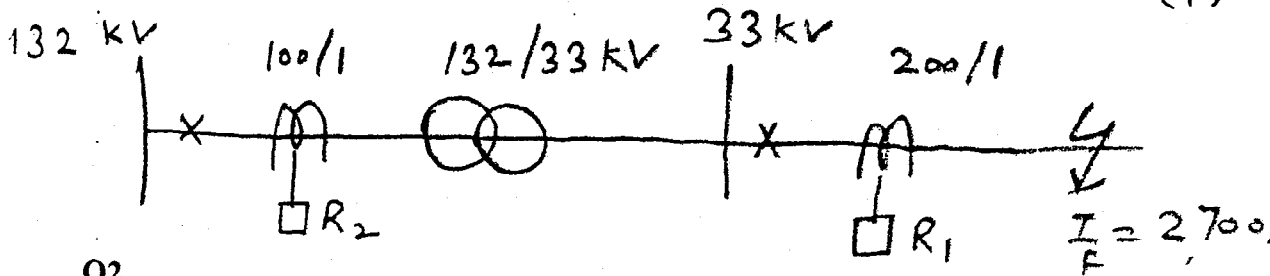
EEE UC462 – Advanced Power Systems

Max Marks 20

Time: 50 Minutes

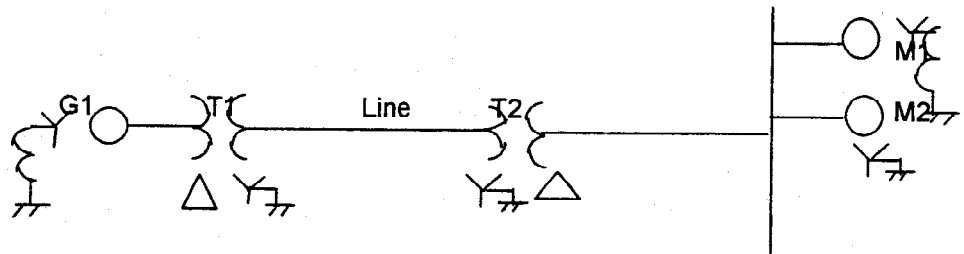
Answer all questions

Q1 It is given that a fault current level at 33 kv side is 2,700 A, CT ratio at 33 kv side is 200:1 and 132 kv side is 100:1 refer figure 1. If both the relays R1 and R2 are set for 100% plug setting, determine the operating time for both the relays when time grading margin of 0.6 second is given and TMS for relay R1 is 0.15. (7)



Q2

In the power system shown below:



- G1 13.8kV, 30MVA, 15%
- T1 13.2kVdelta/115kVstar, 35MVA, 10%
- Line j80 ohms
- T2 three 1-phase transformers each rated 12.5/67kV, 10MVA, 10%
- M1 12.5kV, 20MVA, 20%
- M2 12.5kV, 10MVA, 20%

Draw the reactance diagram with all reactances marked in pu. Select the generator rating as base in the generator circuit. (8)

Q3 Differentiate between high resistance and low resistance method of extinguishing arc. (5)

Name

ID No

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Test-I (Closed Book)

EEE UC462 – Advanced Power Systems

IVth Year- EEE

Max Marks 20

Time: 50 Minutes

Answer all questions

Q1 A power system, having a maximum demand of 100 MW, has a load factor of 30%. It can be supplied by one of the following schemes.

- i) A steam station capable of supplying the whole load.
- ii) A nuclear station capable of supplying the whole load
- iii) A steam station in conjunction with a hydro station, the latter supplying 100×10^6 units per annum with a maximum output of 40 MW.

	Steam	Hydro	Nuclear
Capital cost per kW installed capacity	Rs 600	Rs 1500	Rs 2000
Interest and depreciation on capital	12%	10%	10%
Operating cost per unit	5 Paisa	1 Paisa	2 Paisa
Transmission cost per unit	Negligible	0.5 Paisa	Negligible

Work out total cost of the scheme per annum in each case

(12 Marks)

Q2 Explain clearly how a good load factor and a good diversity factor help to keep the overall cost of generation low. (4 Marks)

Q3 Why power is transmitted at high voltage? Also discuss the reason of using a.c instead of d.c in most of electrical engineering applications. (4 Marks)