



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

THIRD YEAR SUPPLEMENTARY EXAMINATION FOR BACHELOR OF SCIENCE
IN ELECTRICAL AND ELECTRONICS ENGINEERING

SUPPLEMENTARY EXAMINATION

EEE 303: POWER SYSTEM 1

DATE: 29/8/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS.

Answer Question One and Any Other Two Questions

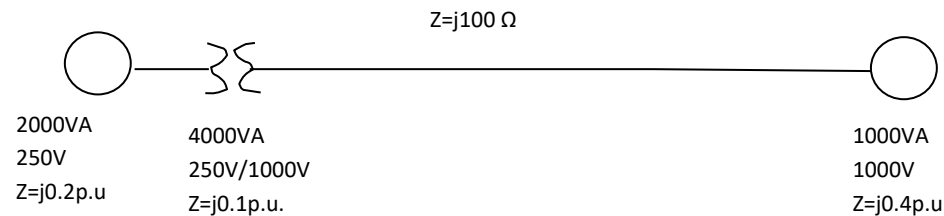
Gravitational force= 10m/s^2

QUESTION ONE (COMPULSORY) (30 MARKS)

- Sketch a labeled schematic diagram of a hydroelectric power generating station and describe the role of the various parts . (10 marks)
- Discuss any TWO factors to be considered when selecting the site for a nuclear power station. (6 marks)
- Derive expression of the most economical power factor. (4 marks)
- Describe three-part tariff. (3 marks)
- List THREE the advantages of per unit system. (3 marks)
- A Sketch a labeled one line schematic diagram of transmission and distribution network showing all the main components and typical voltage levels from generation to final consumers. (4 marks)

QUESTION TWO (20 MARKS)

- a) The primary and secondary of a single phase 2000KVA, 4000/2000 volts transformer have leakage reactances of 4 ohms each. Find pu reactance of the transformer. (4 marks)
- b) A power system is shown below. Redraw this system where pu impedances of the components are represented in a common base of 2000VA and a common base voltage of 250V at the generators. (10 marks)



- c) Sketch waveform for THREE phase supply. (6 marks)

QUESTION THREE (20 MARKS)

- a) A generating station has an overall efficiency of 20% and 0.60kg of coal is burnt per kwh generated by the station. Determine the calorific value of coal in kilo calories per kilogram. Assume 1kwh=1000 kilo calories. (10 marks)
- b) Define electrical tariff. (3 marks)
- c) A consumer has a maximum demand of 100kw at 70% load factor. If the tariff is ksh.200 per KW of maximum demand plus kshs.1 per kwh, find the total cost per kwh. (7 marks)

QUESTION FOUR (20 MARKS)

- a) State four factors to be considered when selecting the site for a coal thermal power station. (4 marks)
- b) Discuss THREE disadvantages of low power factor. (6 marks)
- c) Discuss the importance of transformers in transmission and distribution of electrical energy. (4 marks)
- d) A transformer is rated 4000VA, 500V/100V and 0.1 pu impedance. What is the impedance of the transformer in ohms referred to:
- High voltage side
 - Low voltage side. (6 marks)

QUESTION FIVE (20 MARKS)

- a) Sketch a labeled schematic diagram of a coal thermal power generating station and describe the role of the various parts. (10 marks)
- b) Differentiate between real, reactive and apparent power. Give their SI units (5 marks)
- c) Briefly explain why three phase system is the preferred means of power transmission and distribution. (5 marks)