



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY (ELECTRICAL POWER ENGINEERING)

EEP 2205: ELECTRICAL POWER SYSTEMS I

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: Pick DateSelect MonthPick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions.

Attempt Question any other THREE Questions

Do not write on the question paper.

QUESTION ONE (Compulsory)

a)

i) Define the following terms as used on a power station:

I) Load factor

II) Load curve

ii) A generating station has a maximum demand of 250MW, a load factor of 60%, a plant capacity factor of 72%. Find:

I) The reverse capacity of the plant

II) The daily energy produced

III) Maximum energy that could be produced daily if the plant while running as per as per schedule, were fully loaded. (12marks)

b) Explain the following insulator tests

i) Porosity

- ii) Dry flash over
- iii) Impulse test
- iv) Puncture test (8marks)

QUESTION TWO

- a) State FOUR factors to consider in the selection of site for hydroelectric power station (4marks)
- b) With the aid of a diagram, explain the layout of a hydroelectric power station (10marks)
- c) Explain the role of the following in relation gas turbine power station
 - i) Regenerator
 - ii) Turbine (4marks)
- d) State two problems associated with nuclear power generation station (2marks)

QUESTION THREE

- a) State four advantages of suspension insulator over pin insulators (4marks)
- b) A string has SIX suspension insulators and is used to support one conductor of 66KV, 3 phase overhead lines. The air capacitance between each cap pin junction and the earth to metal tower is one tenth of the capacitance of each insulator unit. Determine:
 - i) The Potential distribution
 - ii) The string efficiency (14marks)
- c) State any TWO desirable properties of power line insulators (2marks)

QUESTION FOUR

- a) State the role of the following in an excitation systems
 - i) Exciter
 - ii) Main exciter
 - iii) Pilot exciter (3marks)
- b) With the aid of a diagram, describe the:
 - i) AC excitation systems with thyristor amplifier

- ii) DC excitation system with magnetic amplifier (13marks)
- c)
- i) Distinguish between the following in a power station
- I) Essential auxiliaries
- II) Non- essential auxiliaries
- ii) State TWO sources of supply to station auxiliaries (4marks)

QUESTION FIVE

- a) State four factors affecting sag in overhead line (4marks)
- b) Using appropriate sketch, show that the expression for sag between two level supports is given by;

$$S = \frac{WL^2}{8T}$$

Where S = Sag between the level support

T = Conductor tension in newton's

W = Conductor weight/ metre length

L = Span in metres (6marks)

- c) A transmission line has a span of 150m between level supports. The conductor has a cross-sectional area of 2cm^2 and the conductor material has a specific gravity of 9.9g/cm^3 . There is a wind force of 14.715 N/m length. Determine the slant and vertical sag if the tension in the conductor is 19.62KN (8marks)
- d) State TWO disadvantages of a wooden line support. (2marks)

