TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

Department of Electrical and Electronic engineering

UNIVERSITY EXAMINATION:

Diploma in Electrical Power Engineering (DEPE 4)

ELECTRICAL POWER SYSTEMS I

EEP 2205

END OF SEMESTER IV EXAMINATION

SERIES: DEC 2016

TIME: 2 HOURS

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 any THREE Questions.
Do not write on the question paper.

Question ONE

(a) State with reference to a coal burning steam power station:

(i) **THREE** considerations made in the choice of site.

(ii) The purpose of:

(I) Super heater

(II) Economiser

(8 marks)

(b) Draw a block diagram of a coal burning steam power station and explain the functions.

(8 marks)

(c) Explain **TWO** major problems of a nuclear electric power station. **(4 marks)**

Question TWO

(a) Define the following power plant term:

(i) Load factor

(ii) Diversity factor

(iii) Capacity factor

(6 marks)

(b) Explain why it is advisable to have a number of generating units in a power station as opposed to one large generating unit with capacity to meet the peak load.

(4 marks)

(c) A power station with an installed capacity of 150MW runs two 50MW units for 8000 hours per annum and one 30MW unit for 1200 hours a year. The station output is 600 x 106Kwh per year. Determine:

(i) Station load factor

(ii) Station plant use factor

(iii) Plant capacity factor

(10 marks)

Question THREE

(a) Explain:

(i) Reason for non uniform voltage distribution over an insulator string

(ii) Three methods used to improve the voltage distribution over an insulator string.

(8 marks)

(a) A string of six suspension insulators is used to support one conductor of a 66kV three phase overhead line. The air capacitance between each cap-pin junction and the earthed metal tower is one tenth of the capacitance of each unit.

Determine:

(i) The voltage distribution

(ii) The string efficiency

(12 marks)

Question FOUR

(a) State FOUR factors affecting sag on overhead lines. (4 marks)

(b) Derive the expression for sag between two level supports having a span of *L* metres, Tension T and a conductor weight of w kg per metre length.

(8 marks)

(b) An overhead line supported in still air from two towers at levels of 30.5m and 61m above a horizontal datum line has a span of 305m. The conductor has a mass of 1.86kg per metre length and an ultimate tension of 89KN. The factor of safety of 5

determine the sag at:

(i) Lower support

(ii) Higher support

(8 marks)

Question FIVE

(a) State:

(i) The purpose of an excitation system

(ii) THREE advantages of a brushless exciter

(5 marks)

(b) With the aid of a diagram explain the thyristor Amplifier excitation system. (8 marks)

(c) State:

(i) Essential characteristics of an excitation system

(ii) Factors determining the necessary excitation

(7 marks)