



TECHNICAL UNIVERSITY OF MOMBASA
School of Engineering and Technology

Department of Electrical and Electronic engineering

Diploma in Electrical Power Engineering
ELECTRICAL POWER SYSTEMS I
EEP 2205

MAY 2025
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) (i) Explain the role of the following in an electrical generating steam power plant
- (I) Super heater
 - (II) Economiser
- (ii) State the drawbacks of a nuclear power plant
- (8 marks)
- (b) State three roles played by voltage regulators in a power plant. (3 marks)
- (c) Explain the roles played by the following in hydroelectric power stations
- (i) spillways
 - (ii) surge tank
 - (iii) automatic isolating valves
- (6 marks)

Question TWO

Question ONE

- (a) Define the following terms

- (i) Load factor
- (ii) Plant use factor
- (iii) Plant capacity factor

- (b) A generating station has a maximum demand of 25MW, a load factor of 60%, a plant capacity factor of 50% and a plant use factor of 72%.

Determine,

- (i) The reserve capacity of the plant
- (ii) The daily energy produced
- (iii) The maximum energy that could be produced daily if the plant while running as per schedule, were fully loaded

Question THREE

- (a) (i) Explain why an excitation system is required
- (ii) State the necessary characteristics required of an excitation system.
 - (iii) State the factors that determine the amount of excitation required.
 - (iv) Explain why individual exciters are preferred to centralized systems
 - (v) Explain why d.c. excitation systems have been superseded by the a.c excitation Systems

(b) With the aid of a diagram describe the a.c excitation system with thyristor amplifiers.

(9 marks)

Question FOUR

(a) Explain

- (i) why voltage distribution over an insulator string is not uniform.
- (ii) Three methods used to improve the potential 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 tower is one tenth of the capacitance of each unit.

Determine;

- (i) The voltage distribution
- (ii) string efficiency

(12 marks)

Question FIVE

(a) State Four factors;

- (i) affecting sag in overhead lines.
- (ii) that determine the type of support for overhead lines

(8 marks)

(b) An overhead transmission line at a river crossing is supported by two towers of height 35M and 95M respectively. The conductor weighs 1.5 kg/m and has an ultimate tension of 62.784KN and the safety factor is 4. The span is 500M and the lowest point on the conductor is midway between the river banks. The bases of the towers are at the water level.

Determine

- (i) Sag at the lower support
- (ii) Sag from the higher support
- (iii) Minimum clearance of the conductor and water level

(12 marks)