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: MAY 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 FOUR

(i) forms of energy other than electrical energy

(ii) reasons that make electrical energy superior to other forms of energy

(iii) sources of energy

(12 marks)

(b) (i) State the factors contributing the complexities in design of power stations.

(ii) State TWO effects of the factors in (b)(i) on the power plant

(4marks)

(c) (i) Explain station load curves

(ii) State Four items of information deduced from the load curves

(8 marks)

(d) Explain the following terms;

(i) Load factor.

(ii) Plant use factor.

(iii) Plant capacity factor.

(6 marks)

(e) Explain why it is unwise to use one large generating unit to meet the power demand as opposed to a number of smaller units.

2. (a) State FOUR;

(i) Merits of a nuclear power plant

(ii) Drawbacks of a nuclear power plant

(iii) Factors to be considered in the selection of site of a nuclear power plant.

(12 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

(5 marks)

3. (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(v) Explain why d.c. excitation systems have been superseded by the a.c excitation Systems

(11 marks)

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

(9 marks)

4. (a) State Four factors;

(i) affecting sag in overhead lines.

(ii) that determine the type of support for overhead lines

(8 marks)

(b) A transmission line has a span of 150M between level supports. The conductor has a c.s.a of $2cm^2$. The conductor material has a specific gravity of $9.9gm/cm^3$and wind pressure is 14.715N/M length. If the tension in the conductor is 19.62KN

Determine;

(i) The slant sag

(ii) vertical sag

(12 marks)

5. (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)

(b) A string of three suspension insulators with a guard ring as shown below suspends one Conductor of a 33KV 3ϕ line.

Determine (i) The voltage distribution

(ii) string efficiency (12 marks)

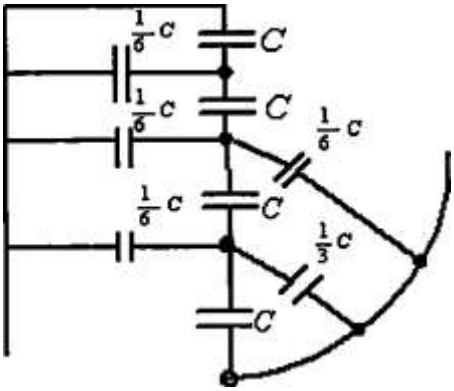

Fig.l