

ELECTRICAL ENGINEERING (POWER OPTION) LEVEL 6

ENG/OS/PO/CR/**10/6** Printed By: And Vocational College **Demonstrate an Understanding of Power Generation**

erstanding of Power Generation November/December 2025

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TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

WRITTEN ASSESSMENT

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Time: 3 HOURS

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INSTRUCTIONS TO CANDIDATE

1. Marks for each question are indicated in the brackets.
2. The paper consists of **TWO** sections: **A** and **B**.
3. Attempt **ALL** questions in section A.
4. Attempt question **FIFTEEN (15)** and any other **TWO (2)** in section B.
5. Candidates are provided with a separate answer booklet
6. **DO NOT** write on this question paper.

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This paper consists of FIVE (5) printed pages

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (40 MARKS)

Attempt **ALL** the questions in this section.

- From a power systems perspective, list THREE critical advantages of solid fuels over liquid fuels in modern energy generation systems. (3 marks)
- An institution in Turkana is setting up a diesel plant for backup. State FOUR reasons why a diesel plant. (4 marks)
- A utility company is planning to diversify its power generation sources. Name THREE principal energy sources harnessed for the generation of electrical power in contemporary power systems (3 marks)
- As an electrical engineering student, you are exploring different forms of energy in power systems. Explain TWO fundamental reasons that qualify electrical energy to be considered superior to other forms of energy. (4 Marks)
- A wind-generating station is to be constructed near Lake Naivasha to boost electricity supply in the area. State TWO environmental problems wind power plants may cause. (2 marks)
- A trainee on industrial attachment at Sondu Miriu hydro power plant was asked to assess the importance of dam construction and its associated risks. Outline TWO dangers that can result from poor dam management. (4 marks)
- During a career talk, students asked about electricity supply in Kenya. Define a generating station (2 marks)
- A industrial visit at Olkaria was shown the cooling tower. State the function of a cooling tower. (2 marks)
- Experts working at a hydropower plant are planning to service auxiliary devices. Name THREE protective devices used in penstocks. (3 marks)
- Engineers are designing a medium-head hydro station. List TWO types of reaction turbines suitable for this site. (2 mark)
- A steam power station has an overall efficiency of 30% and 0.7kg of coal is burnt per kWh of electrical energy generated. Calculate the calorific value of the fuel. (5 marks)
- operates at high steam pressure. State TWO safety practices for workers in such stations. (2 mark)
- In diesel generating stations, lubrication plays a vital role in maintaining engine efficiency and reliability. State TWO key components of the lubrication system essential for smooth operation. (2 marks)

14. Steam power stations should be located at a considerable distance from populated areas.

Explain a major environmental concern prompting such a critical location factor for a steam power plant

(2 marks)

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SECTION B (60 MARKS)

*Attempt question **FIFTEEN (15)** and any other **TWO** Questions in this Section*

15. The Government of Kenya has decided to build a nuclear power plant in Kwale County, but the community opposed it, citing safety and environmental fears. The same project has now been proposed in Siaya County, where leaders have shown support, expecting jobs and industrial growth. The shift in location has sparked a fresh national debate on balancing

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energy needs with public concerns. Supporters highlight the potential for a stable

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electricity supply to power industries and households. However, environmentalists

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continue to urge caution, stressing long-term safety and

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sustainability.

a) Outline FIVE site selection factors that engineers must have considered before proposing the two locations (10 marks)

b) Outline FIVE advantages of nuclear power plant that makes it a viable project to the government of Kenya (10 marks)

16. Kenya relies on thermal stations such as Kipevu to meet demand during peak hours.

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i. List in order, FOUR steps of energy conversion in a thermal power station

(4 marks)

ii. Explain FIVE components critical for improving thermal power plant efficiency and safety.

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iii. List THREE major environmental challenges of thermal stations and propose

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measures. (6 marks)

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17.

a) As an energy consultant tasked with advising a government on the

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establishment of a giant, outline THREE advantages and THREE

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disadvantages that must be evaluated during feasibility studies of the project.

(12 marks)

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Water power generation stations has a reservoir with a capacity of $7 \times 10^{12} \text{ cubic metres}$ ahead of 400metres with the overall efficiency of 75%. If the

density of water is 1000 kg/m^3 . Determine the available: (take 9.81 m/s^2) (8 marks)

i. Weight of water weight of water available

ii. Electrical energy

18. Kenya Electricity Generating Company (KenGen) is expanding Olkaria Geothermal to 700 MW. Printed By Technical And Vocational College

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- a. Outline FIVE advantages of geothermal power. (10 marks)
- b. Explain THREE environmental effects of geothermal power plant. (6 marks)
- c. State FOUL power plant (4 marks)

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