



FACULTY OF SCIENCE

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL MANAGEMENT & ENERGY STUDIES

MODULE **ENS0047**
ENERGY TECHNOLOGY

CAMPUS **APK**

EXAM **NOVEMBER 2015**

DATE **5 NOVEMBER 2015**

SESSION **12:30 – 15:30**

ASSESSOR(S)

DR JOHN LEDGER

EXTERNAL MODERATOR

MR W VAN NIEKERK
(UNIVERSITY OF NORTH WEST)

DURATION **3 HOURS**

MARKS **100**

NUMBER OF PAGES: 2 PAGES

INSTRUCTIONS:

Please answer Question 1 (compulsory) and any TWO of the following FOUR questions. Question 1 comprises ten short questions that can be answered in one paragraph each. The other two answers should be in the form of a comprehensive essay, with sketches and diagrams where these may be appropriate to enhance your answer. Alternatively you may provide your answer in point form. Each answer is worth the same number of marks (33.3%)

QUESTION 1 (COMPULSORY)

1. Short questions

- a). Draw and label a sketch of a pumped storage electricity facility such as Drakensberg or Ngula.
- b). Describe the progress made in recent years with energy efficient lighting at household and commercial level.
- c). At what frequency does the South African electricity grid operate, and how is this kept on target?
- d). Name two liquid biofuels and the plants you might use to make them.
- e). Which plants should not be used in South Africa's proposed biofuel production, and why not?
- f). Name and briefly describe the activities at South Africa's nuclear facilities at Pelindaba.
- g). Describe three energy technologies that use natural gas from Mozambique.
- h). Wind turbines may have negative environmental impacts. Name some of them.
- i). Two different kinds of ash have to be dealt with at Lethabo Power Station. What are they, and how are they handled?
- j). Two different forms of water are used in coal-fired power stations like Lethabo. Explain

[33.3]

QUESTION 2

2. Electricity Generation from the Sun. A number of solar plants have recently been connected to the South African national grid. Describe the energy technologies that can be used to generate electricity from the solar energy of the Sun.

[33.3]

QUESTION 3

3. Hybrid and Electric Vehicles. Most car makers have hybrid and/or electric vehicles in production or under development. Describe the failed efforts to introduce electric cars in California in the 1990s, the renewed interest in the technology, recent advances in battery technology, and the potential benefits and disadvantages of electric and hybrid vehicles.

[33.3]

QUESTION 4

4. Domestic Solar Water Heating Technology. Describe domestic solar water heating technology, how these appliances work, how the challenge of damage by freezing can be addressed, and some of the different designs that are available on the market.

[33.3]

QUESTION 5

5. Bioenergy. Write an essay on the technologies and basics of the chemical and thermodynamic processes of gasification, pyrolysis, torrefaction, carbonization, electricity generation, combined heat and power (CHP)

[33.3]

TOTAL [100]
