



SCHOOL OF COMPUTING AND ENGINEERING SCIENCES  
MASTER OF SUSTAINABLE ENERGY TRANSITION  
END OF SEMESTER EXAMINATION  
MSSET 8504: ENERGY ECONOMICS

DATE: 22<sup>nd</sup> August 2024

Time: 18:00-20:30 Hours

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**Instructions**

1. This examination consists of **FOUR** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

**QUESTION ONE** [20 MARKS]

An independent power producer spent KES 400 million to set up a 5 MW solar PV plant. The company signed a 20 year power purchase agreement (PPA) with the utility company at KES 10 per KWh. For this period the power plant operated at an average capacity factor of 15 % and all other costs are considered to be negligible. With an assumed discount rate of 10% find:

- a) The 20 year annual cash flows
- b) The net present value (NPV)
- c) The levelised cost of Electricity (LCOE) from the power plant [15 marks]

**QUESTION TWO** [15 MARKS]

- a) Discuss how energy demand-side management can be justified from the economic point of view. [6 marks]
- b) The economics of centralised (grid connected systems) varies from the mini/micro grids. Highlight these main differences as applies to energy economics. [9 marks]

**QUESTION THREE****[15 MARKS]**

- a) Briefly discuss;
- i) What is discount rate as used in economic analysis of energy projects and illustrate how it affects the net present value (NPV)
  - ii) Your understanding of the Internal Rate of Return (IRR) and the main concerns that arise with its usage. **[7 marks]**
- b)
- i) Differentiate between short – term and long-term energy demand forecasting
  - ii) Discuss where medium – term and long term demand forecasting find their application in energy economics. **[8 marks]**

**QUESTION FOUR****[15 MARKS]**

- a) With examples discuss the following types of costs as used in energy economic analysis
- i) Opportunity Cost
  - ii) Marginal cost
  - iii) Working Capital
  - iv) Transfer Payments
  - v) Depreciation Cost
  - vi) Externalities **[9 marks]**
- b)
- i) What is an energy spot market?
  - ii) With a schematic illustration explain how and why is there need to manage the energy spot market **[6 marks]**