

## SECTION A [40 MARKS]

Attempt **All** the Questions in this section.

### Question One

**Questions 1 to 5 are Multiple Choice Questions (5 marks).**

Write numbers vertically **1** to **5** in the answer booklet.

Write the letters against the numbers corresponding to the best alternatives.

1. Which of these is a mode of heat transfer?  
A. Radiation                      B. Evaporation                      C. Condensation                      D. Perspiration
2. Which of the following is not a feature of the Rankine cycle as used in vapour power turbines?  
A. Isobaric Heat expansion                      B. Isentropic Compression  
C. Isobaric Heat Rejection                      D. Isentropic expansion
3. Which of the following is the cheapest power plant in operation and maintenance?  
A. Hydro-electric                      B. Steam power                      C. Diesel power plant                      D. None of these
4. Which of the following has the lowest composition in petroleum?  
A. Oxygen                      B. Nitrogen                      C. Carbon                      D. Hydrogen
5. One of the following is not a disadvantage of a nuclear power plant  
A. Fuel is expensive and not abundantly available everywhere                      B. It has high capital cost.  
C. Large space requirement for the plant                      D. Maintenance charges are high.

**Write short answers for Questions 6 to 9 (35 marks).**

6. Briefly explain:  
(i) alternating current                      (ii) voltage  
(iii) ohm's law                      (iv) reactive power                      load factor                      **(10 marks)**
7. State and describe any **five** factors considered when selecting a site for constructing a hydroelectric power plant. **(10 marks)**
8. Mechanical energy is supplied to a DC generator at a rate of 4.2 kW. The generator delivers 32.2 A at 120 V.  
(i) What is the efficiency of the generator?  
(ii) How much energy is lost per minute of the operation **(5 marks)**
9. The government of Uganda has found some uranium deposits in Buyende District. It would like to set up a nuclear power plant in the area. Suppose you are a presidential advisor on energy sector. How would you support this project? **(10 marks)**

## SECTION B (60 Marks) – Choose any three questions

### Question Two

- (a) State any **three** examples of fossil fuels. (3 marks)
- (b) Using examples, describe the two types of biofuels with their merits and demerits. (4 marks)
- (c) (i) Give any **two** examples of biomass used to generate energy. (2 marks)  
(ii) Explain how one of the examples in (d) is used to generate energy. (6 marks)
- (d) The government of Uganda has been exploring oil and gas in western Uganda in the recent decade. Assume you are a consultant on climate change. How would you advise the government to utilise the resource for energy generation, without harming the environment? (5 marks)

### Question Three

- (a) State and explain any **four** variables that drive the economics of electricity generation? (8 marks)
- (b) Give any **three** factors that influence end-use electricity prices? (4 marks)
- (c) As a power engineer, identify and explain any **three** grounds why a given community may resist setting up a power plant in their area. (8 marks)

### Question Four

- (a) Define *nuclear power*. (1 mark)
- (b) State any **three** disadvantages associated with nuclear power plants. (3 marks)
- (c) Give and explain any **three** ways through which nuclear plants can be decommissioned. (6 marks)
- (d) Give any two comparisons of nuclear power generating station and a thermal power generating station. (4 marks)
- (e) Identify and describe any **three** different ways through which geothermal energy can be used. (6 marks)

### Question Five

- (a) With examples, differentiate between renewable and non-renewable sources of energy. (4 marks)
- (b) State and explain **four** environmental implications of electricity supply and consumption in Uganda. (8 marks)
- (c) Describe the operation of a geothermal power plant and give its applications. (8 marks)

### Question Six

- (a) Briefly describe the following:
  - (i) Francis turbine
  - (ii) Kaplan turbine(6 marks)
- (b) (i) State any **two** ways in which a hydroelectric plant can be classified..  
(ii) With a drawing, describe the schematic arrangement of a hydroelectric power station. (10 marks)
- (c) A hydroelectric station has an average available head of 100 metres and reservoir capacity of 50 million cubic metres. Calculate the total energy in kWh that can be generated, assuming hydraulic efficiency of 85% and electrical efficiency of 90%. (4 marks)

END