UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

SECOND SEMESTER EXAMINATIONS, APRIL/MAY 2019

COURSE NO: RN 272

COURSE NAME: ENERGY STORAGE AND DISTRIBUTION SYSTEMS

CLASS: RN II **TIME:** 3 HOURS

Name**:** _____Index Number: _____

INSTRUCTION: Answer all Questions

Question 1

(a) Describe the three (3) characteristics of electrical power systems **(6 Mks)**

(b) Discuss three (3) requirements for power network monitoring, control and protection **(6 Mks)**

(c) With the aid of appropriate diagrams, differentiate between the following protection techniques:
(i) Overcurrent Protection (ii) Distance Protection (iii) Differential Protection **(8 Mks)**

Question 2

(a) Define smart grid technology and the need for it in our modern electrical power system. **(4 Mks)**

(b) State five differences between smart grid and conventional (traditional) grid **(5 Mks)**

(c) Explain the functions of the following components of the electrical power system

(i) Automated Meter Reading (AMR) (ii) Advanced Metering Infrastructure (AMI)

(iii) Smart Grid System **(6 Mks)**

(d) With the aid of appropriate diagram, explain the concept of smart grid technology using a renewable energy technology, electrical grid and diesel generator with a net zero export to the grid. **(5 Mks)**

Question 3

(a) What is energy storage systems and state some of its benefits **(4 Mks)**

(b) With the aid of a diagram, describe the operation of pumped hydro energy storage **(6 Mks)**

(c) Describe the main types of Inverters **(4 Mks)**

(d) An organisation wants to enhance the reliability of power supply to their premises, so that they have power supply all year round. As an Engineer, your advice is requested as to the best inverter to be adopted to integrate a renewable energy technology to the grid. Please propose one and explain your reasons. **(6 Mks)**

EXAMINER: K. B. OWUSU/ *Assoc Prof C. K. Amuzuvi*