



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS FOR THE DEGREE IN SCIENCE IN RENEWABLE  
ENERGY TECHNOLOGY AND MANAGMENT**

**2<sup>ND</sup>YEAR 1<sup>ST</sup>SEMESTER 2018/2019 ACADEMIC YEAR**

**CENTRE: MAIN CAMPUS**

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**COURSE CODE: TET 3214**

**COURSE TITLE: ELECTRIC POWER APPLICATIONS**

**EXAM VENUE: STREAM: BSc REN ENERGY TECH & MGT**

**DATE: ../12/2018 EXAM SESSION:**

**DURATION: 2 HOURS**

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### **Instructions**

- 1. Answer question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**
- 4. Use the IEE tables provided**

## QUESTION ONE

- a. The IEE regulations give guidance on the amount of diversity which may be allowed for various installations.
- i). Explain why such allowance are needed. **(4 MARKS)**
  
  - ii). Explain the reasons for the differences shown in the allowances for
    - 1). lighting in domestic premises and in offices
    - 2). convection heaters in flats and hotels
    - 3). stationary appliances in domestic premises and shops **(4 MARKS)**
- b. i) What are the advantages of alternating current for transmission of power? **(3 Marks)**
- ii). State reasons why PVC cable are unsuitable for use in extremes of high and low temperatures **(3 Marks)**
- iii). If a twin cable has 4 mV per ampere per meter and is 50 meters long, what is the resistance of the core? **(3 Marks)**
- iv) What is meant by Protective Multiple Earthling (PME) **(2 Marks)**
- v) Make labeled sketch showing the arrangement at the consumer intake supply when PME is used **(5 Marks)**
- c. i). Use a simplified labelled diagram to show different voltage levels in Kenya ( **3MARKS**)
- ii). In an installation where both signal (data cable like TV aerial) wiring and power wiring exists in the same building, what is minimum allowable distance of separation between these two installations. **(3 MARKS)**

## QUESTION TWO

- a. Describe the IEE regulations covering the following: -
- i. Capacitors **(2 Marks)**
  - ii. Foreman's emergency **(2 Marks)**
  - iii. Lamp holders in bathroom **(2 Marks)**
  - iv. Discharge lamp loading on a sub-circuit **(2 Marks)**
- b. A contactor coil and capacitor connected in series on a 240 V 50Hz supply when tested by an Ohmmeter gives 300 and 150 ohms respectively. The resistance of the wire completing the circuit was found to be 5 Ohms.
- i. Calculate the current that can flow in the circuit. **(3 Marks)**
  - ii. The value of the capacitor **(2 Marks)**
  - iii. The value of Inductor **(2 Marks)**

- iv. The impedance of the circuit **(3 Marks)**
- v. The resonance frequency **(2 Marks)**

### QUESTION THREE

In a domestic wiring design, the following three circuits were drawn into a conduit: -

- 1. A three phase and a neutral whose phases are 16 mm<sup>2</sup> and a neutral of 10 mm<sup>2</sup>
  - 2. A single phase of 6 mm<sup>2</sup>
  - 3. A single phase of 4 mm<sup>2</sup>
- a.
- i. Use the tables given to calculate the maximum size of conduit required
  - ii. State the reason for the reduction of the neutral size in circuit 1. **(8 Marks)**
- b. If a trunking system is has been used for enclosure, of the cables, from the tables given, calculate the minimum size required **(6 Marks)**
- c. State the factors that determine the choice of wiring method. **(6 MARKS)**

### QUESTION FOUR

- a) Show with aid of a diagram, the method of reversing the direction of the following induction motors;
- i. Single-phase split phase **(4 Marks)**
  - ii. Three phase **(4 Marks)**
- b) State two methods of starting a three phase cage type induction motors **(2 Marks)**
- c) Explain what's meant by the slip of an AC motor **(2 Marks)**
- d) A wound rotor induction motor is causing the starter overloads to trip each time the operator attempts to start the machine. State two possible causes of electrical defect in each of the following: -
- i. The starter section of a starter
  - ii. The rotor section of the starter
  - iii. The motor
  - iv. The winding **(8 Marks)**

### QUESTION FIVE

- a. With the aid of expressions, state the laws of illumination
- b. A Church Hall measuring 12m by 20m is to be provided with an illumination level of 360lux using 80W fluorescent tubes having an efficiency of 40 lumens per watt. If the utilization factor is 0.65 and maintenance factor is 0.85;

- i. Determine the number of tubes required,
- ii. Make a plan of the office and show the spacing of the tubes. **(20 Marks)**