MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR THIRD SECOND EXAMINATION

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING.

2601-105-EIT I : ELECTRICAL INSTALLATION TECHNOLOGY I.

DATE: 16/12/2020 **TIME: 2:30 – 5:30 PM**

INSTRUCTIONS TO CANDIDATES

Attempt any five questions of the following Eight questions.

1. a) Explain the following terms with regard to electrical wiring circuits;

   i) Insulation resistance
   ii) Inspection . (4 marks)

   b) State the following with regard to an electrical installation wiring circuit ;

   i) Any two IEE Regulations requirement for IR testing .

   ii) Any two reasons for carrying out polarity tests . (4 marks)

   c) Define the following components of an electric bell circuit ;

   i) A Sounder
   ii) Indicator Board . (4 marks)

   d) i) Explain with a labeled diagram the operation of a continuous ringing type of electric bell. (6 marks)
   ii) State any two advantages of an open – circuit alarm system . (2 marks)

2. a) Define the term" wiring system". (3 marks)

   b) Describe with the aid of a diagram the operation of an electromagnetic overload trip. (6 marks)

c) Explain the following terms with regard to consumer circuits;

i) Distribution Board

ii) Final sub – circuit. (4 marks)

d) Show with the aid of wiring diagram a 3 – point control of three lamps by use of one intermediate switch and two 2 –way switches . (2 marks)

e) State the following ;

i) Any three essential features of a consumers intake point as required by the IEE regulations .

ii) Any two IEE regulation requirements of a domestic ring final circuit. (5 marks)

3. a) Define the following terms ;

i) Earth – Continuity Conductor

ii) Consumer's earth resistance . (4 marks)

b) Explain with a labeled diagram the current operated earth leakage circuit breaker. (6 marks)

c) Define the following terms with regard to measurements ;

i) Instrument efficiency

ii) Accuracy . (4 marks)

d) Explain with a labeled diagram the Air Friction damping method used in indicating instruments. (6 marks)

4. a) i) Define a ' fire – alarm system '.

ii) State any two sensing elements used as heat detectors in fire alarm systems. (4 marks)

b) Show with a labeled diagram a closed - circuit fire alarm powered by a 24V d.c supply and is installed in a building divided into three sections to meet the following conditions ;

i) One bell and two call points required in each section .This bell only rings in the respective section when there is fire .

ii) A main bell which rings whenever there is fire in any section.

iii) Any section that's on fire is shown through an indicator. (5 marks)

c) State any three IEE regulations regarding bell transformers. (3 marks)

d) Show with the aid of a labeled diagram the sequence of control equipment at the intake point of a two – wire consumer installation . (4 marks)

e) State the following

i) Any two factors to be considered when choosing a wiring system.

ii) Any two advantages of a non-metallic conduit wiring system. (4 marks)

5. a) With the aid of a labeled line diagram show a typical power supply system layout indicating standard voltages at every stage. (4 marks)

b) i) A moving coil instrument with a resistance of 25Ω gives a f.s.d with a voltage of 25mV . The instrument is to be used with a series multiplier to extend its range to 10. Calculate the error caused by 10° C rise in temperature . (6 marks)

ii) State any two advantages of an Open circuit fire -alarm system as compared to Closed circuit fire alarm system . (2 marks)

c) Explain with the aid of a labeled diagram the insulation resistance test of conductors to earth for a complete 2 – wire installation . (8 marks)

6. a) A 240 V single – phase motor develops a full – load output of 4 KW at an efficiency of 84% and 0.75 power factor. It is supplied by means of a 2 – core copper cable 200 m long. The cross – sectional area of each conductor of the cable is 25 mm^2 .Calculate ;

i) The voltage drop in the cable

ii) The power wasted in the cable.

(Take resistivity of copper as 17.5μΩmm). (5 marks)

b) i) Three different wards in a hospital are provided with a call system .Draw a circuit diagram showing the electrical connections for the system comprising one main bell , reset point , battery and a three - way indicator board . 3mks

ii) Explain with the aid of a diagram the operation of an open circuit fire alarm system used for two zones. . (7 marks)

c) State the following ;

i) Any two Disadvantages of a Hydro – electric power plant .

ii) Any three Advantages of a Pumped storage hydro – electric plant. (5 marks)

7. a) i) Explain with the aid of a diagram the construction of a Permanent magnet moving coil instrument. (8 marks)

ii) Define the National Grid system with regard to Kenya . (2 marks)

b) Describe the following classes of Hydro – electric power plants;

i) Run off river plants without pondage.

ii) Low head plants. (4 marks)

c) Explain the following types of tools used in Electrical workshops ;

i) Bench Vice. (3 marks)

ii) Hacksaw. (3 marks)

8. a) Describe the following types of joint methods

i) Soldering

ii) Welding (4 marks)

b) Explain the procedure for making a Tee-twist joint with a single- core conductor. (5 marks)

c) Define the following terms with regard to protection devices;

i) Current Rating

ii) Fusing Factor. (4 marks)

d) State any three factors considered in the site selection for an Hydro – electric power plant . (3 marks)

e) Explain the following civil engineering works of an hydro – electric power plant;

i) Penstock.

ii) Forebay. (4 marks)