MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR CERTIFICATE IN ELECTRICAL AND ELECTRONIC ENGINEERING.

EPC 113: ELECTRICAL INSTALLATION TECHNOLOGY 1

DATE: 13/12/2017 **TIME: 8.30-10.30 AM**

INSTRUCTIONS

Answer Question One and Any Other Two Questions

SECTION A- COMPULSORY

1. a) Define the following terms
   i) Earth – continuity conductor
   ii) Consumer's Earth Resistance. (4 marks)

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

   c) i) State any three advantages of trunking wiring system as compared to conduit wiring system. (3 marks)
   ii) Describe the Holger Nielsen method used as a first aid treatment to victims of a electric shock in an electrical workshop (5 marks)

   d) i) Define the term" wiring system". (3 marks)
   ii) State any three purposes of installing bare and lightly insulated conductors in buildings. (3 marks)

   e) A 4.7 KW, 240V, 50Hz single phase load operating at full- load efficiency of 90% and 0.87 power factor lagging is to be supplied from a distribution board

90m away. Find the most suitable cable size from table 1 below to satisfy the load current and volt drop requirement. (6 marks)

Table 1

Cable size(mm^2)	6	10	16	25	35
Current rating (A)	77	105	140	180	220
Volt drop /A/m(mV)	7.0	4.4	2.8	1.8	1.3

SECTION B- ATTEMPT ANY TWO QUESTIONS

2. a) Define the following terms
   i) Wiring Accessory
   ii) Switch (4 marks)

   b) i) Describe the earthed concentric wiring system .
   ii) State two advantages of earthed concentric wiring system. (5 marks)

   c) Describe the following types of jointing methods
   i) Clamping
   ii) Welding (5 marks)

   d) Describe the procedure for making a Tee-twist joint for conductors. (6 marks)

3. a) Explain the following terms;
   i) Sheathing
   ii) Flexible cable (4 marks)

   b) State any two of the following
   i) Properties of Copper as a conductor material.
   ii) Advantages of Aluminium as a conductor material (4 marks)

   c) State the following;
   i) The IEE regulation B23 regarding the voltage drop in a consumers installation.
   ii) Any three factors that affect the current carrying capacity of a cable. (5 marks)

   d) i) Define the term diversity factor as applied to a consumer installation . (2 marks)
   ii) A fixed cooking appliance has 2 hot plates rated at 2 KW each, 2 hot plates each rated at 1.5 KW, an oven rated at 1 KW and a grill rated at 700W. If the rated voltage of the cooker is 240V, determine the size of a

cooker control Unit suitable to supply the appliance when it is to incorporate a socket outlet. (5 marks)

4. a) State the following

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

(ii) Any two advantages of a non-metallic conduit wiring system. (5 marks)

b) Describe the following wiring systems

i) Cleated Wiring

ii) PVC sheathed (6 marks)

c) State three safety requirements with regard to conductors and apparatus of an electrical installation to be observed against an electric shock. (3 marks)

d) State Three main functions of earthing an electrical system. (3 marks)

e) Show with a labeled diagram the earth fault loop path taken by a fault current in a consumers installation. (3 marks)

5. a) i) Define the term safety with regard to an electrical workshop

ii) Explain two methods for the protection against the risk of an electrical shock. (6 marks)

b) i) Explain with a diagram the construction of a 2-core paper insulated lead sheathed steel wire armoured cable/ (5 marks)

ii) State any three methods used for electrical conductor identification. (3 marks)

c) 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 and the cross – sectional area of each conductor of the cable is 25 mm^2 .Taking the resistivity of copper as 17.5 μΩmm , calculate;

(i) the voltage drop in the cable

(ii) the power wasted in the cable. (6 marks)