



COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY
SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING
CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 5
EEE449- ELECTRICAL INSTALLATION TECHNOLOGY C

FINAL EXAMINATION – PENSTER 5, 2015

TIME: 2HOURS 10MINUTES
ROOM: AS PER TIMETABLE

INSTRUCTIONS TO STUDENTS

1. *You are allowed 10 minutes Extra reading time during which you are NOT to write.*
2. *Begin each answer on a fresh page and use both sides of the sheet.*
3. *Write your candidate-number at the top of each attached sheet*
4. *Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with string*
5. *For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to your answer scripts.*
6. *Write clearly the number(s) of the question(s) attempted on the top of each sheet.*
7. **ANSWER ALL QUESTIONS.**
8. *Show all workings where necessary.*
9. *Do not use programmable calculators, especially the ones that do the conversions of number systems.*
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!**
11. *Electrical Wiring rule book is allowed.*

SECTION A (Use rule book wherever necessary for both section A and B) (60 MARKS)

1. List five (5) specific locations for emergency lighting in building. (5marks)
2. List four (4) technical terms associated with fuses in any electrical installation. (4marks)
3. Circuit breakers are classified by consideration of the means used to obtain tripping action. List the four types of tripping mechanism used in circuit breakers. (4marks)
4. What are the requirements for protection by means of automatic disconnection of supply? (4marks)
5. Calculate the available short circuit current of a three phase 415V transformer if the fault level of a transformer is given as 12MVA. (5marks)
6. A three phase 240V/415V 500KVA transformer is supplying load through mains and sub-mains. If the impedance of the transformer is given as 4% and the impedance per phase of the mains is 0.0030 and the sub-main is 0.020, calculate the fault current at:
 - a) Transformer
 - b) Main switchboard
 - c) Sub-board(9marks)
7. How would you carry out the following tests on a new installation wiring before power is switched on;
 - a) Polarity test
 - b) Insulation test
 - c) Operation of ELCB(9marks)
8. List at least 5 visual inspections that are carried out by a supply authority on a new installation before power is switched on. (5marks)
9. Draw the single line diagram for:
 - (i) Direct earthing system
 - (ii) Multiple earthed neutral(MEN) system(10marks)
10. Outline the advantages of circuit breakers over a fuse. (3marks)
11. How switchboard wiring should be designed and installed. (2marks)

Section B**(40marks)**

1. The following load is connected to a three phase 240/415 volts supply in a domestic installation.
 - a) 20 lighting points
 - b) 10 only GPO
 - c) 1 x 3 phase 7kW range, comprising 4kW hotplates, 3kW oven)
 - d) 1 x 2.5kW air conditioning unit(single phase)
 - e) 1 x 10.8kW instantaneous water heater(3 phase)
 - f) 1 x 2kW clothes dryer(single phase)

Arrange the loads over the three phases so that it is balanced, hence calculate the maximum demand. (14marks)

2. A circuit wiring has the following information.

Consumer mains: length-10m
 Current-70A
 Cable-16mm²

Sub-mains: length-20m
 Current-40A
 Cable-6mm² wired in conduits

Final sub-circuit: length-12m
 Current-15A
 Cable-1.5mm²

- a) If the supply is three phase 240V, calculate the voltage drop over the route length of the circuit.
- b) State if the voltage drop is in accordance with the rules.
- c) If the answer is NO in part (b) above, show with necessary calculations the changes required so that the voltage drop is within the rules.

(10marks)

3. What has to be taken into account when arranging an electrical installation into an appropriate number of circuits?
(3marks)
4. How should the output circuit of autotransformer be insulated?
(2marks)
5. List down six factors that affect the designing of an installation.
(3marks)

6. What is the maximum distance between supports or length of spans of the following types of aerial conductors;
- a) 6mm^2 – insulated hard drawn copper conductor
 - b) 6mm^2 – bare hard drawn copper
 - c) 16mm^2 – bare aluminum conductor
- (4marks)
7. What is a residual current device (RCD)?
- (2marks)
8. Define voltage surge and how is it caused.
- (2marks)

END OF PAPER