



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

THIRD YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE AWARD
OF
DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING**

COURSE CODE: DEE 087

COURSE TITLE: POWER SYSTEMS II

DATE: Tuesday 26th April, 2022 TIME: 3.00 pm - 5.00 pm

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory

Answer Any Other TWO (2) questions

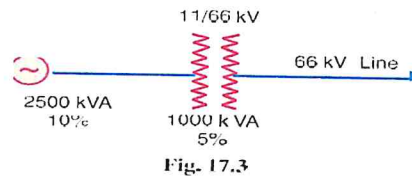
TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

QUESTION ONE (COMPULSORY)

(30MARKS)

- a) Define the following with respect to power systems
i) Overhead lines
ii) Sub-station
iii) Symmetric fault (6 marks)
- b) Give **two** reasons why underground cables are rarely used for power transmission. (2 marks)
- c) Briefly discuss the **three** types of cable faults. (6 marks)
- d) Define circuit breaker and give three differences between a circuit breaker and a fuse. (6 marks)
- e) Discuss load flow studies. State any two iterative algorithms used in solving load flow equations. (6 marks)
- f) Consider a 3-phase transmission line operating at 66 kV and connected through a 1000 kVA transformer with 5% reactance to a generating station bus-bar. The generator is of 2500 kVA with 10% reactance. The single line diagram of the system is shown in Fig. 17.3. Suppose a short-circuit fault between three phases at the high voltage terminals of transformer.



Determine the short circuit current. Use a base KVA of 3000KVA. (4 marks)

QUESTION TWO (20 MARKS)

- a) Discuss any **four** components of overhead lines. (8 marks)
- b) State any **three** desirable properties of conductor material for use in transmission and distribution of power. (3 marks)
- c) Discuss the various types of power system faults.

- d) State three types of insulators that are most commonly used. (6 marks)
- (3 marks)

QUESTION THREE (20 MARKS)

- a) Below figure shows the general construction of a 3-conductor cable. Briefly discuss the various parts. (12 marks)

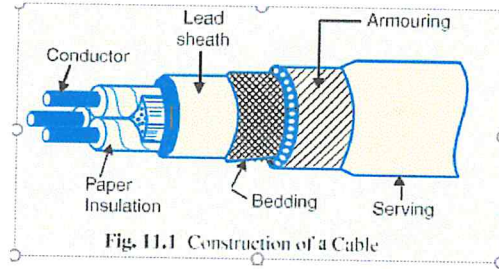
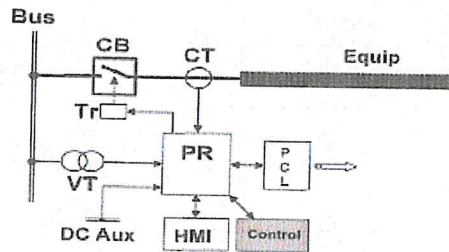


Fig. 11.1 Construction of a Cable

- b) state any **four** equipment found in a transformer substation. (8 marks)

QUESTION FOUR (20 MARKS)

- a) Below is a diagram showing the basic protection scheme components



Discuss the function of each element clearly showing its contribution towards fault isolation. (12 marks)

- b) State any three types of line supports and discuss the various factors to be considered on their selection. (8 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss the various ways of connecting short circuit current limiting reactors in a three phase system. (9 marks)
- b) A 3-phase transmission line operating at 10 kV and having a resistance of 1Ω and reactance of 4Ω is connected to the generating station bus-bars through 5 MVA step-up transformer having a reactance of 5%. The bus-bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the short-circuit kVA fed to symmetrical fault between phases if it occurs
- i. at the load end of transmission line
 - ii. at the high voltage terminal of the transformer

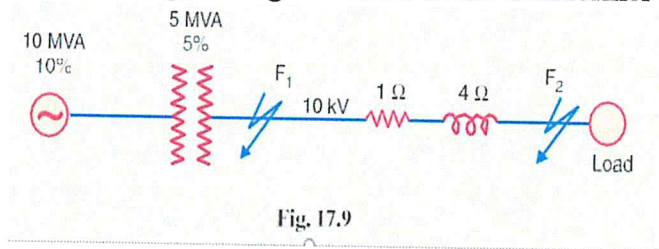


Fig. 17.9

(11 marks)