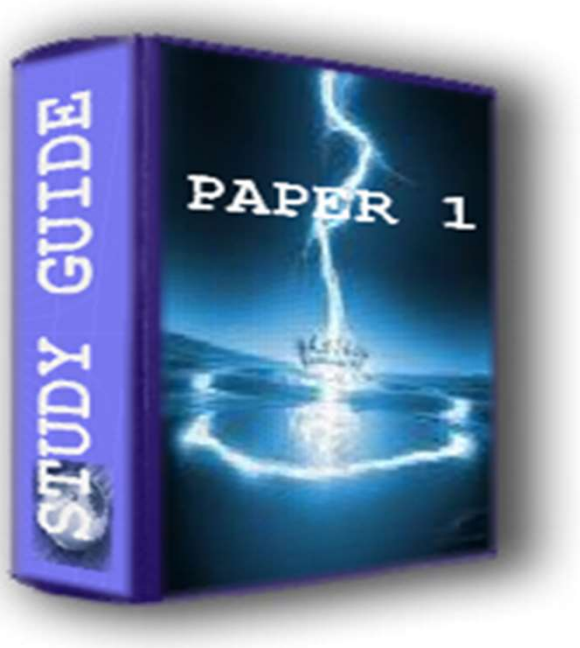
INSTALLATION RULES PAPER 1



STUDY GUIDE

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INSTALLATION RULES PAPER 1

STUDY GUIDE

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INTRODUCTION

During the course of any class, you will be required to process a great deal of information, you will need an effective way to learn the concepts and remember them, since your knowledge of the subject will be tested – the Installation Rules Course is no exception. Study guides are a proven methodology that will help you outline and remember the important pieces of information. The Installation Rules Study Package is provided to make the student's exam preparation less of a headache and to shorten their preparation time. It consists of the **Study Guide**, **Past Exam Papers** with Memos and the **Exam Simulator Software**. The Installation Rules Study Package is designed to be easy-to-use instrument to help our students pass their exams convincingly on the first try. The design of the Installation Rules Study Package is based on the principle that, for a product to be effective, it must be simple and easy to use.

ABOUT THE AUTHOR

The Author of the Installation Rules Study Package is a registered Installation Electrician in terms of the Electrical Installation Regulations. He passed the Installation Rules Exams with distinctions [Paper 1 with **92%**, Paper 2 with **82%**]. He has for the past few years thoroughly researched every topic that is covered in the Exams and his research revealed specific content areas and concepts that are critical for one to know, understand and apply in order to be victorious in the Exams. The author has taken that information and compiled the Installation Rules Study Package that is guaranteed to produce positive results. The Author is devoted to consistently provide the best Installation Rules Study Package and Support that not only meet the student's needs but also that surpass their expectations

OUR OBJECTIVE

We have done our best in making sure that the Installation Rules Course objectives are met by providing our students with an excellent Study Package packed with detailed, step by step examples and many Exam–Style Questions. The main objective of our Study Package is to give our students the Knowledge, the Practice and the Confidence necessary to pass their Exams with flying colours on their first try. Our Study Tools ensures that the student's understanding of the material covered in the Regulation Standards is solidified.

STUDY PACKAGE FEATURES

The Installation Rules Exams are not easy but with the right tools at your disposal and hard work you can make it. The Study Package consists of the **Study Guide**, **Revision Exercises**, the **Exam Simulator Software** and **Past Exam Papers** with **Memos**. These study tools ensures that your understanding of the material covered in the course is solidified and at the same time ensuring that all the objectives and aims of the installation rules course are satisfied. Past Exam papers together with memorandum are provided to give you an idea of how to answer Exam questions. The Installation Rules Study Package offer a self-paced method of preparing for the exams in the shortest possible time. The Student will go through all the sections of the regulation books without guessing which sections of the standards they need to focus on. In short, the tools focuses on all important areas of the course with great emphasis on sections that will be in the actual exam sitting. **We encourage our students to concentrate on the material presented in the Study Guide.**

THE STUDY GUIDE

Study Package is completely updated to the latest electrical Regulation Book and Standards. The information provided in the Study Guide is divided into three sections: **Section 1** gives the Student carefully worked out examples of calculations, **Section 2** is divided into Modules 1 to 10 – in these modules the Student is guided through the theory part of the Regulation Books by answering questions similar to the ones they will face in the exam and **Section 3** consists of the revision exercises to test the Student's understanding of the material covered.

THE EXAM SIMULATOR

The Exam Simulator does not generate Exam questions haphazardly - most of the questions generated will be in the actual exam. What The Exam Simulator does is that it systematically generates ten Exam questions in Internet Explorer similar to the ones the Student will face in the actual Exam session. The Exam Simulator helps to solidify the Student's understanding of the material covered in the regulation books while at the same time helps the Student to build the confidence necessary to face the actual exam sitting. Generate as many exam sessions as you like and for each exam session generated set aside 3 hours to answer the Exam questions.

WELCOME

We would like to welcome you to the **Installation Rules Paper 1 Study Guide** and we thank you for investing in our study material. If you have never taken this exam or have attempted it before, this study guide together with the accompanying software will give you some idea of what to expect the actual exam session to be like and to sharpen your skills on how to answer such exam questions.

The Installation Rules Study Tools ensures that your understanding of the material covered in the Regulation Standards is solidified and also ensures that all the objectives and aims of the Installation Rules Course are satisfied - keep in mind that for the Installation Rules exams you are required to demonstrate **sufficient knowledge**, **understanding** and **application** of the regulation standards.

The information provided in this guide is divided into two sections: **Section 1** gives you worked out Examples of calculations for Paper 1. Most of the Examples are taken from Past Exam Papers. **Section 2** is divided into Modules 1 to 10 – make sure to answer **ALL** the questions in these Modules. For ease of use each question in the Modules have **Page numbers** next to them indicating where you can get the answer to that particular question in the Regulation Book. We have included answers to **Modules 1**, **6 and 7**, for answers to calculation questions please refer to Examples.

First, start and work through the Study Guide then next do the Assignments and Revision Exercises – the Revision Questions are in a separate file. For more revision and practice run the Exam Simulator and give yourself THREE hours per session to answer generated questions – you may use this as the final preparation for the Exam.

Paper 1 Study Package will surely give you Sufficient Knowledge, Understanding, Practice and the Confidence required to pass your exam with flying colours on the first try.

"The best preparation for tomorrow is doing your best today."

"He who is well prepared has half won the battle."

The Installation Rules Study Mate Team

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IMPORTANT TABLES FOR PAPER 1

You have to be able to apply the following tables for paper 1 questions:

PAPER 1 FORMULAE

Power: is a rate at which work is being done and is measured in Watts or in Volt Amps (VA). It is calculated by the current (in Amperes) multiplied by the voltage (in Volt).

Watt (W): The standard SI unit of measure of electric power and is defined as the power dissipated by a current of 1 ampere flowing across a resistance of 1 ohm. The **Horsepower (HP)** used for electrical machines is **746W** – so 1HP = 746W.

Kilowatt (kW): A unit of power equal to 1000 watts [also known as **True** Or **Active Power**]. **k = 1000**

Kilo-Volt Amp (kVA): A unit of power equal to 1000VA [also known as **Apparent** Or **Reactive Power**].

Power Factor (Cosα): Is determined by the True Power divided by Apparent Power –> **Cosα = kW/kVA**

Kilowatt Hour (kWh): A unit by which residential and most business customers are billed for monthly electric use. It represents the use of one kilowatt of electricity for one hour. A 100W light bulb burning for 10 hours would use 1kWh of electricity.

Megawatt (MW): A unit of power equal to one million watts and **Megawatt Hour (MWh)** is the use of 1 million watts or 1000 kilowatts of electricity for one hour.

SINGLE PHASE CIRCUITS	DC CIRCUITS	THREE PHASE CIRCUITS
Power (P) [in W]= V x I x Cosα	Power (P)= V x I	Power (P) [in W]= √3 x V x I Cosα
Cosα = P (in W)/P(in VA)	Power (P)= I^2 x R	Cosα = P (in W)/P(in VA)
P(in VA) = P (in W)/Cosα	Power (P)= V^2 / R	P(in VA) = P (in W)/Cosα

Estimated Load = Connected Load x Diversity Factor

EXAMPLE 1

ANNEXURE C

ASSESSING OF ESTIMATED AND CONNECTED LOAD FOR RESIDENTIAL TYPE INSTALLATIONS WITH KNOWN DIVERSITY FACTORS

1. **Calculate from the following information given, the maximum number of single phase motors of 0,75kW each that may be installed according to the regulations:**

   - **10kVA / 220 V single – phase transformer using a power factor of 0,95**
   - **Floor area 399m²**
   - **One electric water heater of 2kW**
   - **One electric oil heater of 500 W**
   - **20 lights**

2. **Test your answer by making use of any other alternative method**
3. **What is the value of the main protection of the transformer?**

EXAMPLE 19

CONDUCTORS IN CONDUIT: [ANNEXURE F]

Calculate the conduit size required to accommodate the following circuit:

- **Stove circuit using 6mm^2 conductors**
- **TWO socket outlet circuits using 4mm^2 for each circuit. Use minimum required ECC.**

Explain how the answer above was determined.

The following tables are given in the exam: Table 6.23 – Value of C for conductor cross-sectional area, and Table 6.24 – Values of K for conduit diameter.

NOTE: Expect this question in both Paper 1 and 2 exam papers. Do the examples given in Annex F of SANS 10142 as well

MODULE 1

OCCUPATIONAL HEALTH

&

SAFETY ACT

MODULE 1

OCCUPATIONAL HEALTH

&

SAFETY ACT

ANSWERS

MODULE 6

SELECTION, HANDLING AND INSTALLATION OF ELECTRICAL POWER CABLES OF RATING NOT EXCEEDING 33kV - SELECTION OF CABLE TYPE AND METHOD OF INSTALLATION

SANS 10198

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MODULE 6

SELECTION, HANDLING AND INSTALLATION OF ELECTRICAL POWER CABLES OF RATING NOT EXCEEDING 33kV - SELECTION OF CABLE TYPE AND METHOD OF INSTALLATION

SANS 10198

PART 1 & 2

ANSWERS

MODULE 7

EARTHING OF LOW VOLTAGE DISTRIBUTION SYSTEMS & ELECTRICITY SUPPLY SYSTEMS

SANS 10292 & ANNEXURE J

MODULE 7

EARTHING OF LOW VOLTAGE DISTRIBUTION SYSTEMS & ELECTRICITY SUPPLY SYSTEMS

SANS 10292 & ANNEXURE J

ANSWERS