

TINA Cloud

WEB-BASED CIRCUIT DESIGN & ANALYSIS

Teacher's Guide

DesignSoft

www.designsoftware.com

COPYRIGHTS

© *Copyright 1990-2020 DesignSoft, Inc.* All rights reserved.

All programs recorded on the original release CD of *TINA* and the accompanying documentation are copyrighted. *TINA* is provided under a License Agreement and may be used or copied only in accordance with its terms and conditions.

LIMITED LIABILITY

TINA, together with all accompanying materials, is provided on an “as is” basis, without warranty of any kind.

DesignSoft, Inc., its distributors, and dealers make no warranty, either expressed, implied, or statutory, including but not limited to any implied warranties of merchantability or fitness for any purpose.

In no event will DesignSoft Inc., its distributor or dealer be liable to anyone for direct, indirect, incidental or consequential damages or losses arising from the purchase of *TINA* or from use or inability to use *TINA*.

TRADEMARKS

IBM PC/AT, PS/2 are registered trademarks of *International Business Machines Corporation*

Windows, Windows 9x/ME/NT/2000/XP/Vista / Windows 7/8/10 are trademarks of *Microsoft Corporation*

PSPice is a registered trademark of *MicroSim Corporation*

Corel Draw is a registered trademark of *Corel Inc.*

TINA is a registered trademark of *DesignSoft, Inc.*

TABLE OF CONTENTS

1.	TRAINING, EXAMINATION	1-1
1.1	Introduction	1-1
1.2	Starting the Examination/Training tool	1-1
1.3	Choosing a Problem	1-2
1.4	Problem Types & Support Functions	1-2
1.4.1	Selections	1-2
1.4.2	DC and AC Problems	1-2
1.4.3	Troubleshooting	1-2
1.5	Using the Test Window	1-3
1.5.1	The Tasks Selection List	1-3
1.5.2	The Current Tasks	1-3
1.5.3	The Advisor	1-4
1.5.4	Notes on DC and AC Problems	1-4

1.6	Finishing Problem Solving	1-5
1.7	Examples	1-5
1.7.1	Notes on Troubleshooting	1-5
1.7.2	DC Problem	1-6
1.7.3	AC Problem	1-7
1.7.4	Troubleshooting	1-8

2. EDUCATIONAL APPLICATIONS 2-1

2.1	Introduction	2-1
2.2	Problem construction	2-1
2.2.1	The Exam Manager in TINA	2-2
2.3	General considerations	2-4
2.4	Working with the Advisor	2-4
2.5	Problem types	2-5
2.5.1	Multiple Choice	2-5
2.5.2	DC Problems	2-5
2.5.3	AC problems	2-6
2.5.4	Troubleshooting	2-6
2.6	Problem set construction with the TTask	2-7
2.6.1	Running TTasks	2-7
2.6.2	Parameters of problems	2-8

3. SUPERVISING TRAINING AND EXAMINATION 3-1

3.1	Managing Classes	3-1
3.2	Uploading Tests and Assigning them	3-3
3.3	Downloading and Deleting Tests	3-4
3.3	Monitoring Test Results	3-4

4. TUTORIAL	4-1
4.1 Multiple Choice	4-2
4.1.1 TINA	4-2
4.1.2 TASK	4-3
4.2 DC Problem	4-3
4.2.1 TINA	4-4
4.2.2 TASK	4-4
4.3 AC Problem	4-5
4.3.1 TINA	4-5
4.3.2 TASK	4-6
4.4 Troubleshooting	4-6
4.4.1 TINA	4-6
4.4.2 TASK	4-7
4.5 Preparations & Starting	4-8

TRAINING, EXAMINATION

1.1 Introduction

This chapter describes how to use TINACloud in training/examination mode. For advice on preparing problem sets, see the next chapter. TINACloud has two special tools for educational purposes. With the exam test tool, the student has to solve a series of problems (a problem set or test) either by traditional pencil-and-paper methods or by using the Interpreter and analysis functions. When the student submits the answer, the program stores it immediately in a database on the server, so the teacher may examine the results on his machine, with the TSuper, supervisor page. Operation is similar in training mode, except that TINA gives the student feedback about the correctness of his answer and the result is not stored on the server. In both modes, the student may turn to the Advisor to get help prepared by the teacher.

1.2 Starting the Examination/Training tool

To open the examination or training tool you need to invoke the *Tools.Education and Training.Training test* or *Exam test* menu. After this a small dialog appears on the screen where the student may choose a test from the tests that are available on the server and are enabled for him. The tests may be uploaded and enabled for a user on the TSuper page. See chapter 3.

After pressing OK in the test selection dialog the test dialog appears on the screen and the first task is opened.

1.3 Choosing a Problem

The student may select a problem to work on with the Tasks Selection List on the top of the Examination/Training Window.

The Tasks List contains the name of the tasks with an optional red checkmark next to it. The check mark indicates that the task has been answered by the user (the program does not indicate whether this solution was correct or not).

1.4 Problem Types & Support Functions of *TINA*

The program distinguishes the following problem types:

- Selections (multiple choice)
- DC problems
- AC problems
- Troubleshooting

To assist the student, different problem types enable various functions; however, other general functions of *TINACloud* are disabled.

1.4.1 Selections

In this problem type, the student has to choose the right answer from a list of alternatives (multiple choice). *TINA*'s general functions are not available.

1.4.2 DC and AC Problems

DC and AC problems are similar, but both a phase solution and an amplitude solution are required for AC problems.

1.4.3 Troubleshooting

In this mode, a fault has been inserted into the circuit, and the student's goal is to identify the faulty component. The program permits a variety of options. The possibilities are:

- Read *DC* or *AC* meters and nodal voltages: The student may click on various meter or nodes and read the corresponding nodal voltages and values.
- Running a *transient* or *digital* timing analysis: The student may run the transient or digital analysis with the default analysis settings and examine the generated diagram.

1.5 Using the Test Window

After selecting an examination/training test the Test window appears on the screen. This window is used to give the answer to the questions/tasks.

There are two methods of giving the answer:

- A method particular to the problem type (e.g. typing, pointing, etc.). These are described later in this chapter.
- Multiple choice (selection). The student is presented with a list of possible answers and has to select the correct one.

The teacher determines which way the student will be required to give the answer.

It is possible that the student will give several answers in succession. The TSuper page shows and evaluates only the last solution.

1.5.1 The Tasks Selection List

The student can select a task from the Tasks list. The red check mark indicators to the right of the task names shows that the student has visited the problem and submitted an answer to the server (regardless of the validity of the solution).

1.5.2 The Current Tasks

The Current Task panel allows the student to prepare and submit a solution to the problem. The contents of this panel are dependent on the type of the problem. The Submit standard button will validate the solution and file it in the student records.

TINACloud will only accept as correct those solutions that are formally valid; e.g., in DC problems both the numerical value and units must be correct. If the answer is a numerical/symbolic expression, the correct units must also be given. When using the training mode, TINACloud will either confirm the answer or tell the student how the solution is incorrect (e.g., missing unit, syntax problem, etc.).

A portion of the Current Task panel varies with the type of task and whether the problem has been given in multiple choice form:

- If the problem is in multiple choice form, a listing of possible choices is displayed. The student must mark one alternative and press the Submit button.
- For DC and AC optimization problems, the student must submit one result and its unit (dimension).
- For AC problems of a non-optimization nature, two values (amplitude and phase) and their corresponding units must be specified.
- For fault insertion problems, four buttons become available: The *Select* button will let the student point to the component he/she considers to be faulty, (the name and type of the selected component appears above the buttons); *DC* or *AC* opens the DC or AC nodal voltage window where the selected component's, node's voltages and currents can be read. Finally the popup menu of the *Diagram* button can be used to start a Transient or Digital analysis and display its result in the Diagram Window. After selecting the faulty part the student still must press the Submit button to submit her solution.

1.5.3 The Advisor

The Advisor panel gives access to the hints that were prepared by the teacher. Some advice items carry a penalty. You can navigate in the advice set with the left and right arrows.

1.5.4 Notes on DC and AC Problems

After the student presses the Submit button, TINA calculates the correct result, then requests the student's solution. In exam mode, TINA only does formal checking (missing dimension and syntax). In training mode, it also checks the dimension, the numerical value, the order of magnitude, etc.

In DC mode, the program requests only one value. This is generally the indicated value of a meter or an equivalent component (e.g., a current arrow).

In AC mode, while the requested value is also a meter's value, it is a complex peak value. Both the amplitude and the phase are required.

It is possible to give the answer in symbolic form. Some examples are shown later.

NOTE:

The unit must be specified in the drop-down unit field. You must respect the case of the unit (e.g. Ampere is A and not a). Remember that TINA expects the complex peak value and not the effective value in AC problems. The phase can be specified in degrees or radians. Its unit is [] or [deg] or [rad], respectively. The program has a 1 % tolerance in the accuracy of the result.

1.6 Finishing Problem Solving

A problem solving session can be concluded by closing the Test window.

The student should be careful not to quit the problem solving mode by accident. If this happens, he should reopen the Test window and continue to answer the remaining tasks. Previous answers are preserved on the server, but the check marks in the selection list indicate only those tasks that were answered in the current session.

1.7 Examples

1.7.1 Notes on Troubleshooting

Problem:

What is Ohm's Law?

A: $R=U*I$

B: $U=I*R$

C: $I=U*R$

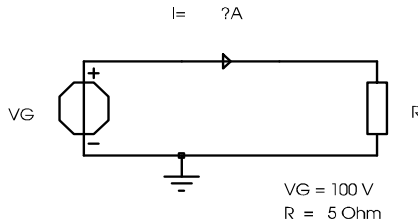
Solution:

The correct answer must be selected from the list of possibilities presented. Here, the correct answer is B ($U=I*R$)

1.7.2 DC Problem

Problem:

Ohm's Law



Calculate the current (I) through R.

Solution:

The solution can be determined by using Ohm's Law:

$$V_G = IR$$

Then we have:

$$I = \frac{V_G}{R} = \frac{100V}{5\Omega} = 20A$$

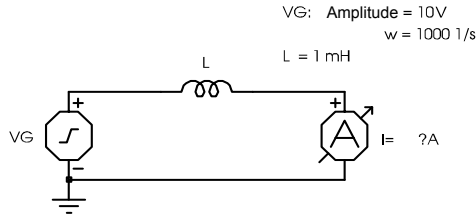
This solution can be given

- numerically:
20 [A]
- symbolically:
 V_G/R [A]
- with the Interpreter:
 $i := V_G/R$
Result(i [A])

1.7.3 AC Problem

Problem:

AC Problem



Determine the complex current through L (amplitude & phase).

Solution:

The solution is similar to the previous example, but we have to deal with complex peak values and impedance:

$$\hat{V}_G = \hat{I}Z, \text{ where } Z = j\omega L$$

By substituting the numerical values:

$$\hat{I} = \frac{\hat{V}_G}{Z} = \frac{\hat{V}_G}{j\omega L} = \frac{10\text{V}}{j1000 \frac{1}{\text{s}} 1\text{mH}} = \frac{10}{j} \text{A} = -10j\text{A}$$

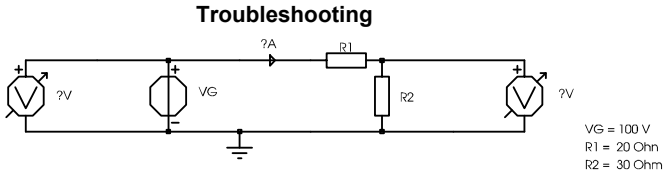
This solution can be given

- numerically:
10 [A]
-90 [deg]

- symbolically:
 $Abs(VGA / (j*VGw*L)) [A]$
 $Arc(VGA / (j*VGw*L)) [rad]$
- with the Interpreter:
 $i := VG/R$
 $Z := j*VGw*L$
 $I := VGA / Z$
 $Result2(Abs(I) [A], Arc(I) [rad])$

1.7.4 Troubleshooting

Problem:



Determine which component is faulty.

Solution:

First we have to see what the symptoms are:

1. Set **Analysis | Faults Enabled** to Off (not checked): only the good circuit's results will be displayed.
2. Execute **Analysis | DC Analysis | Calculate nodal voltages**. This will display the electronic status of the good circuit.
3. Set **Analysis | Faults Enabled** to On (checked): only the faulty circuit's results will be displayed.
4. Execute **Analysis | DC Analysis | Calculate nodal voltages**. This will display the electronic status of the faulty circuit.
5. Examining the results and discover the symptoms:
 - the current is unexpected (3.33 A instead of 2 A), and
 - the voltage on R2 is unexpected (33.33 V instead of 60 V).

Now, since we are confident that the voltage generator will not have been given a fault and is working correctly, the faulty component must be one of the resistors. None of the resistors are shorted or open (that wouldn't give the results we see here), so the value of one of the resistors must be wrong. By applying Ohm's Law for each resistor, we get:

$$R_{1F} = \frac{V_{R_{1F}}}{I_{R_{1F}}} = \frac{66.66 \text{ V}}{3.33 \text{ A}} = 20 \Omega$$

$$R_{2F} = \frac{V_{R_{2F}}}{I_{R_{2F}}} = \frac{33.33 \text{ V}}{3.33 \text{ A}} = 10 \Omega$$

Since according to the specification R2 must be 30W it is clear that the faulty component is **R2**.

EDUCATIONAL APPLICATIONS

2.1 Introduction

The material in this chapter will help you apply TINACloud in education. Here you will find more information about problem construction, training, and examination.

If you want to use the educational mode of TINACloud you still need to have the desktop version of Tina installed.

TINA is needed if you want to create individual problems. The problem sets can be assembled (from the individual problem files) with the TTask utility.

2.2 Problem construction (TINA & TTASK)

Problems can be created and tested using TINA in the normal analysis mode with the help of the Exam Manager (View | Exam Manager). If the problem files are ready use the TTASK utility to assemble a problem set. If the problem set is ready save it in a Task archive format and upload it using the teacher supervisor site.

2.2.1 The Exam Manager in TINA

The Exam Manager can be activated from the Schematic Editor's View menu. Its task is to help the teacher prepare a problem solving task by inserting faults into the circuit, specifying possible alternatives for a multiple-choice solution, and/or to develop hints (advice) for the given problem.

2.2.1.1 Fault Management

The Fault Insertion panel allows you to insert and remove faults. Before you can insert a fault, you have to create a new version of the circuit to contain the fault. To do this, select an unused version from the Current Circuit list box. You can delete the current version by pressing the Delete Version button (you cannot delete the original circuit).

To insert a fault:

1. Select the version you want to insert the fault into (you cannot insert faults into the original circuit).
2. Click on the Insert Fault button. The cursor shape will change indicating that you are now in fault insertion mode.
3. Click on the component into which you wish to insert the fault. The Component Attribute Editor will appear.
4. Make your changes to the component (you should limit your changes only to one parameter of the component in general). Press OK when ready. The component will change color to indicate its faulty state.

To revert a faulty circuit component to its original version:

1. Click on the Revert to Original button. The cursor shape will change indicating that you are now in reverting mode.
2. Click on the component in the circuit you want to be restored to its original version. Click only on a faulty (specially colored) component. The color of the component will return to original.

To revert all components in the current version to their original version press the Revert All button.

2.2.1.2 Multiple Choice (Selection) Management

Use the selection management panel to prepare alternate solutions for a problem. The student will be able to select one of these alternatives at examination/training time.

For DC and AC problems TINA will actually determine each time which is the right answer by analyzing the solution strings. This means that the solution alternatives you give must obey the solution interpreter syntax.

For other types of problems, you will have to specify explicitly in the selection editor dialog which answer is correct. Of course, you can designate only one answer as right. It will be denoted with an » in the selection list.

To add a new selection alternative, press the Add... button. The selection editor dialog will appear. You can specify whether this is the right solution by (un)checking the This is the good answer field.

To edit an already-added selection, press the Edit... button. The same editor dialog will appear.

To delete a solution, highlight it and press the Delete button.

The order in which you enter the alternatives does not matter since TINA will re-order them randomly when presenting the list to the student.

2.2.1.3 Advice Management

You can use the advice management panel to prepare hints for the student. Each item of advice may or may not carry a penalty. If it does, the student's score will be discounted (both scores and penalties are measured in percent).

The upper right corner of the advice manager displays the number of the current advice and the total number of advices. You can move among the advices with the left and right arrow. The order of advices is important: the student will be able to access them in the same sequence as they are ordered in the Exam Manager.

To add a new advice at the end of the advice list, press the Add button. The advice editor dialog will appear.

You can enter the advice and the penalty (in percent) in this dialog.

To insert a new advice before the current advice, press the Insert button. The same advice editor dialog will appear.

To delete the current advice, press the Delete button.

To edit the current advice, press the Edit button.

2.3 General considerations

The circuit files containing the problems (.TSC files) must be placed into the TINA directory or one of its subdirectories. Files corresponding to the same problem set should be kept with the problem descriptor file (.EXA) in a separate subdirectory.

The teacher may pose problems in two forms. In one form, the answer must be given numerically, with units. In the second case, the right solution must be chosen from a multiple choice list.

The student can seek help from the Advisor, whose content and access can be controlled by the teacher.

The construction of problems can be done in the normal operating mode of TINA. Problem sets can be compiled by TTask.

2.4 Working with the Advisor

We recommend that the text fit entirely in the Advisor hint box. Another consideration is that the sum of the percentages in all the hints for a given problem can not exceed 100. A hint with a percentage of 0 means that it is free. Students can only get to the hints sequentially.

In DC and AC problems of the multiple choice type, the hints should be placed into the main circuit (because, of course, the shadow circuits have no role). In trouble-shooting problems, hints should be put in the circuit version containing the fault. In these circuits, a series of hints can be attached to each fault.

The teacher can always deny the student access to hints on a particular problem by using TTask to disable the Advisor.

2.5 Problem types

There are several different problem solving modes in TINA

- 1 Multiple Choice by selection of the right answer from a list.
- 2 Solution of DC problems.
- 3 Solution of AC problems.
- 4 Troubleshooting.

2.5.1 Multiple Choice (Selection from a list)

In this mode, the analysis functions of TINACloud have no role and there is only one correct answer. During training/examination mode, the answers will not appear in the order they were given in the text file; instead, each time the problem is visited, a randomly ordered set of solutions will be displayed. We recommend that you provide no more than 7 multiple choice answers. You may find it useful to place further text (questions, hints, etc.) or explanatory figures directly onto the problem's circuit diagram.

2.5.2 DC Problems

The program will execute an Analysis|DC Analysis|Nodal voltages command and will compare its result with the student's answer. TINACloud will ask about the values displayed by the measurement instruments. The present version handles only one instrument at a time, so restrict your problems to only one instrument.

The unit (dimension) is determined by the type of instrument:

voltmeter or voltage tap:	Volt [V];
ampere meter or current arrow:	Ampere [A];
impedance meter:	Ohm [Ohm];
power meter:	Watt [W].

You can pose DC problems in Multiple Choice form.

If a multiple choice menu is associated with a problem, then it will appear instead of a request for a numerical answer. Since the program will analyze (parse) the text of each of the answers to determine which one is right, you should be sure that the right answer in the multiple choice menu exactly matches the one expected by *TINA*, both in syntax and semantically. Since *TINA* is checking the answers in the text, you don't need to specify which is the good answer. Be sure to enter the correct unit, and remember that if you change the problem, you must also change the corresponding text.

2.5.3 AC Problems

As in the case of DC problems, the program asks for the value that would be shown on a meter. Here, however, the student must give the answer in complex form, with magnitude and phase angle. *TINACloud* executes the Analysis | AC Analysis | Nodal voltages command at a specific frequency, and that frequency cannot be altered. Since *TINACloud* uses this frequency during problem solving, it must be set when creating the problem.

Note that, while angular frequency (ω) is traditionally used in network equations, *TINACloud* asks for frequency (f) data in units of Hz. The well-known formula relating the two units is $\omega = 2\pi f$. For instance, $\omega = 1000$ radians/s is used in the example (see the description of the exam/train mode), so the frequency in the analysis is 159.1549 Hz.

Selection (multiple choice) menus can also be used with AC problems in the same manner described for DC problems. The only difference is that the student must choose an answer correct in phase as well as in voltage. The unit of phase is [deg] or [$^\circ$].

2.5.4 Troubleshooting

The construction of the circuit in *TINACloud* consists of the following steps:

- < Drawing the reference (faultless) circuit (Original).
- < Selection of the Version #1 circuit on the Exam Manager panel.
- < Fault insertion with the Insert Fault button. You will be prompted to modify the component values or set the Fault attribute.

- < Addition of Advisor and/or selection texts.
- < Repeating the steps above to create other faulty versions.
- < Checking by analysis to verify that the versions operate as intended. To do this, the faulty circuit should be displayed and the Analysis | Faults Enabled switch used to switch between good and the faulty circuit.

Consider the following aspects of the construction of circuits for troubleshooting:

- < The maximum number of circuits is 16, so the maximum number of possible faulty versions is 15.
- < The analysis parameters should be set appropriately to minimize student difficulties. The reference and faulty circuit versions will all use the same analysis parameters.

Remember that Advisor texts (hints) that you want to insert should be placed in the faulty (shadow) circuit versions. You can allow the student to use the selection option to choose where the fault lies. To do so, you must place one error description (selection) line marked good in each faulty circuit version. In addition, place several extra selection lines into the reference circuit. The program collects and mixes all these lines and displays them as one collection from which the student may choose in examination/training mode.

2.6 Problem set construction with the TTask program

TTask is a utility for compiling problem sets for the examination/training mode of TINACloud.

TTask and its auxiliary files are automatically installed by the TINACloud installation program into the TINACloud directory.

2.6.1 Running TTasks

The program can be started by double-clicking on the Ttask icon or by selecting TTask from the Start menu.



To modify an existing problem set, use the **File | Open** command. Once you open a problem description file (**.EXA**), the Task List Panel will present the problem names included in the problem set. When you select a problem (by clicking on its name in the Task List Panel), you will see the parameters of the selected problem in the Task Editing Panel. These parameters will be described in the following section. You can also create a new problem set using the **File | New** command. An empty Task List Panel will appear. Use the **Add** command button to create a new entry and specify the problem file (**.TSC**) name, the problem name, and some further parameters (described in the following subsection). When you are finished with the current problem, press the **Task OK** command button to save it back to the problem set (navigating away from the current problem and saving the problem set will imply a Task OK for the currently edited task). If you decide you don't want to use the latest changes, you can discard your modifications by pressing **Task Cancel**.

The operation of TTASK is simple and there is detailed **Help** available by pressing the [F1] key. In the lower line of the TTASK window (status line), the commands and other useful information are given.

2.6.2 Parameters of problems

In the **Task Editing Panel**, you set the parameters of the problems:

Name which can be a character string of no more than 30 characters. A problem name can give a clue as to the subject (1. Ohm's law), or can be more general (Problem 1).

File the name of the circuit file made with TINACloud (**.TSC** file). The name can contain a relative path to the TINACloud main directory.

Type which can be one of the following: selection (multiple choice), DC, AC, troubleshooting.

In the **Options group**

Advisor selecting this option [X] allows the use of the Advisor.. Of course, you must create the necessary hints if you're using the Advisor.

Selection by selecting this option, [X] you can enable/disable the selection list for a particular problem.

For Troubleshooting problems, you can set the following additional parameters:

“Faults enabled” ON by default: You can set the parameter (On / Off) for the initial state of the Faults enabled switch.

“Faults enabled” locked: You can disallow the student to change the state of the “Faults enabled” switch by checking this checkbox. If it is not checked, the student can switch between the “good” and “bad” versions of the circuit. If checked, the student can study the circuit only in the state depending on the previous switch (“Faults enabled” ON by default).

Faulty circuit: This can be a number between 1 and 15, or the random number variable, Random. This is simply the version number of the shadow circuit. If the random variable was chosen, the program will select a different faulty circuit for each student at random. Be sure to use circuit version numbers that correspond to an existing problem. If a wrong number is entered here, TINACloud will select Random.

Circuit editing: Enables/disables circuit editing. If enabled, the student can delete or place wires and meters, simulating real world troubleshooting. This flag has no effect if the problem set is used in TINACloud.

Different types of problems can be mixed arbitrarily within one set of problems, but keep the number of problems in a set to 15 or less.

It is helpful to establish a naming convention for the problem description files. For example: [year][class][date of test][group].EXA.

Select File.Save As... to save the task list. In the save dialog change the file filter to Tina task archive to save the task list in a compressed format. If the task list is saved load the teacher supervisor page and upload the task list onto the server.

SUPERVISING TRAINING AND EXAMINATION

With the **TSuper** page, the teacher can supervise (monitor and control) the training and examination process. This page can be accessed with supervisor privileges by using the `http://<tinacloud_domain_with_folder>/tsuper.php` URL. The **TSuper** page contains two subpages the *Classes* and a *Results* page. The *Classes* page can be used to define a group of students as a class and upload and configure new tests for them. The *Results* page can be used to monitor the answers the students gave to a particular task. The results submitted by the students can be seen in real time as the student opens a task and submits an answer or off-line, after the examination session.

3.1 Managing Classes

In the **TSuper** page the *Classes* tab shows the classes and the tests of the authorized supervisor.

To create a new class, we first need to click on the *New* button on the top of the page and enter a new class name. The class name will identify a group of students on the *Results* page so it needs to be unique among the classes of the logged in supervisor.

After the class is created, its name appears in the classes list next to the *New* button. To delete the class simply select the class in the Class list and click the *Delete* button.

NOTE:

Deleting a class will not delete the test results of the users belonging to that class, only their membership will be deleted from the class.

To add new users to a class press the *Add* button below the *Members list* and enter the email addresses of the users separated by comma or new line in the *Add Class Members* dialog. Here we may also set the *Initial registration period* until the users' TinaCloud registration will be valid. If a registration already exists for the given email address and its registration period is longer than the given period, its registration will not be changed. If its registration period is shorter, then it will be extended to the given period. Finally, if a registration does not exist for the given email address, the server will create a new TinaCloud registration with the given expiry date and automatically send the registration email with login credentials to the user. In any case, the users will be added to the selected class and appear in the *Members* list.

A supervisor may create as many student accounts as he wishes, but only the licensed amount (based on the supervisor's registration) may be active any given time. So we may create new accounts each semester while keeping the old accounts, if we set the old accounts' expiry date to an old/expired date. To set an expiry date just double click on the date in the class members list, specify a new value, then press *Apply* in the bottom of the *Members* panel. The number of your currently activate students can be seen in the status line above the *My Tests* panel.

NOTE:

The expiry date of the new registrations cannot be greater then the expiration date of the supervisor's registration.

The expiry date of the new registrations cannot be greater then the expiration date of the supervisor's registration.

To delete a user from a class we need to first select the user in the *Members* list, then press the *Delete* button below the *Members* list.

If a user's registration was made by the supervisor (with the *Add class members* dialog) the supervisor may also examine the actions this user made during his TINACloud session by selecting the user and clicking the *History* button on the bottom of the page.

3.2 Uploading Tests and Assigning them to Students

Using the TSuper page teachers may upload new tests and set their properties. Tests have to be created with the TTask program and exported as exam archive (*.exar) files. This file contains both the circuit and exa files. To upload the test archive click on the *Upload* button in the *My Tests* panel. In the upcoming *Upload Test Archive* dialog specify a *Test Name* and select the exar file, then press *Upload*. The uploaded test will appear in the *My Tests* list. This list shows the test's names, types and visibility flags. The type can be 'training' or 'exam' and the visibility can be 'User', 'Class' or 'All'. These settings can be changed by clicking in the appropriate cell in the list then pressing *Apply* below the list. The meaning of these properties is the following:

- **Training** type: The test is a training test, so students will get a feedback on whether the submitted solution is good or bad.
- **Exam** type: The test is an exam test, so student will not get any feedback on whether their answer is correct and the answer is stored on the server, so the teacher can examine it later.
- **User** visibility: The test can be made visible to individual users by selecting a user in the *Members* list on the left and checking the *User* flag in the *My Tests* list.
- **Class** visibility: The test can be made visible for the whole class by selecting a class from the class selection list and checking the *Class* visibility checkbox.
- **All** visibility: If this checkbox is checked, the test is available for everyone who has a valid TinaCloud registration.

NOTE:

To verify whether the visibility settings of a test is correct, right-click on the test name. In the upcoming dialog TSuper will list all the users who can see the selected test. Similarly, if you right-click on a user in the Members list, TSuper will show all the tests that are available for that user.

3.3 Downloading and Deleting Tests

To download or delete a test archive from the server select the test in the *My Tests* list and click on *Download* or *Delete*. If a test is deleted, all the corresponding test results/answers are also deleted from the server, so these results will not be listed anymore in the Results list on the *Results* tab.

3.4 Monitoring Test Results

Answers of the examination tests submitted to the server are stored in a database for later viewing. Teachers may see the answers, calculated scores, penalty and other statistics of their student on the *Results* tab of the TSuper page.

To start viewing students' results login to the TSuper page, turn to the *Results* page, select the appropriate class on the top of the page and press *Refresh*. Now the result list will be filled with all the available test data of the students that belong to the selected class. If you do not want to see all the test results – only the results of a particular test or a particular user – you may filter the list by entering an expression in the filter edit boxes above the column names and pressing Enter or *Refresh*. Note that for text fields you may enter only a part of the text, TSuper will list all the data where the field contains the filter text. For date fields the TSuper will list all the tasks that are within +/- 3 hours of the specified time.

By default the result list is displayed hierarchically, grouped by the user name field and the header of the groups contains the summary of the data within the group. To change the grouping of the list, right-click on a column title and select *Group by <column name>* from the popup menu.

The result list contains the following fields:

- **User name:** the user name of the student.
- **Last changed:** the last time the state of a task is changed. If the state is 'untouched' this time denotes the time when the user started to work on the test. The header contains the latest *last changed* time within the group.
- **Test name:** Name of the test as specified in the *My Tests* list.
- **Task:** Index of the task within the test. The header contains the number of tasks in the group.
- **State:** This can be

Untouched: the user has started to work on the test, but has not opened this task yet

Opened: the user has seen the task, but has not submitted an answer to it yet.

Answered: the user has submitted an answer to this task.

The header contains the *number of answered tasks / number of tasks* in the group.

- **Score**: the calculated score, based on the last submitted answer to this task. The header contains the average score.
- **Advices**: the number of advices the student has used. The header contains the sum of the used advices.
- **Penalty**: the penalty based on the number of advices used. The header contains the average penalty.
- **Total**: the final score, that is the score – penalty. The header contains the average total.
- **Answer**: this column is hidden by default, but you may enable it by right-clicking on the list header and selecting *Answer* from the *Columns* popup menu. This field contains the answers of the users. If the answer comprises several values (e.g. amplitude, phase and dimension), they are separated by commas.

To follow the students results in real time, you may enable the automatic refresh of this list by selecting an appropriate *Repeat after* interval and pressing *Refresh*.

CHAPTER 4

TUTORIAL

To round out the discussion above, we will present a tutorial section of

- creating the four problems with TINACloud that were presented in the previous chapter,
- collecting these separate problems into one problem set with TTask,
- preparing for and starting an examination session with TINACloud and TSuper, and archiving the results for later reference.

The TEST subdirectory of TINACloud is an ideal place to store problem sets. To avoid clutter, we decide to create a sub-sub directory here called '4A-1998-11-06-Basic Electricity' (4A stands for the class ID, 1998-11-06 is the exam date, and Basic Electricity is the name of the course). We will save all our schematics files and the task list into this directory. Please note, that this is only one possible naming convention. Please feel free to develop a naming convention that suits you the most.

In the following sections we will show you the creation of each problem and the problem set itself in parallel (to make things more understandable), but this is not necessary: you can first create the problems with TINACloud and then the problem set (task list) with TTask.

So let's start by double-clicking on the TINACloud and TTask icons. When TINACloud has started, go to the View menu and click on Exam Manager to make the Exam Manager visible on the right. In TTask, make sure you start a new problem set by using the File|New command. It is a good idea to save your (still empty) problem set right away in our T:\TINA\TEST\4A-1998-11-06-Basic Electricity\ directory under a name of Exam.EXA (or any other name you wish) so that you can just press the Save button later.

Caution! In order to making sure that students will see problems as designed, it is recommended that you use the same screen resolution for authoring as the students will use for the training/exam session. The Exam Manager is exactly the same width and position as the Examination/Training Panel the student sees in training/exam mode so you are advised to leave it displayed during the whole authoring session.

4.1 Multiple Choice (Selection)

What is Ohm's Law?

A: $R=U*I$

B: $U=I*R$

C: $I=U*R$

4.1.1 TINA

Execute a **File | New** command.

Use the Insert | Text command to enter, format, and position the text "What is Ohm's Law?". Position the text so that it is approximately in the middle of the screen.

Go to the **Selection** tab on the Exam Manager and press the **Add** button. Enter " $U=I*R$ " without the quotation marks and **check** the "This is the good answer" checkbox. Press Add again, and enter " $R=U*I$ ", now leaving the "This is the good answer" checkbox **unchecked**. Press Add once more, and enter " $I=U*R$ ", again leaving the "This is the good answer" checkbox **unchecked**.

At this point you may add additional text, graphics, even circuit elements to the circuit to further illustrate the question, at your liking. Optionally, you may want to add Advisor text as well. We will show you how to do this in the next example.

You have finished editing this problem. Use the **File | Save** command to save the circuit in T:\TINA\TEST\4A-1998-11-06-Basic Electricity\OhmsLaw.TSC.

4.1.2 TTASK

Press the **Add task** command button. Select the newly added task in the Task List Panel. TTask will display the task parameters in the Task Editing Panel.

In the **Name** field, enter "Ohm's Law" (without the quotation marks).

In the **File** field, click on the ellipsis (...) button and select the OhmsLaw.SCH file just saved in TINA. Please note that in the File edit box you will see *only the relative path* (to the TINA directory) of the file. This is so, because TINA will automatically add its home directory to the beginning of the path. This means that all train/exam schematics files must be located in the TINA directory, or one of its subdirectories.

Set the **Type** to Selection.

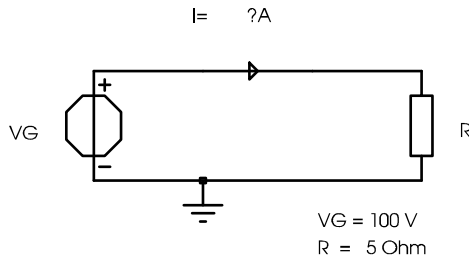
If you have included advisor hints in the circuit, and want to let the students to access these hints, then check the **Advisor** checkbox.

Leave the **Selection** checkbox checked.

You are done with this task. Press the **Task OK** button to add your changes to the task list, then press the **Save** button to save your work. (Please note that pressing Task OK is optional: pressing Save will implicitly add your changes to the task list before saving it.)

4.2 DC Problem

Ohm's Law



Calculate the current (I) through R.

4.2.1 TINA

Execute a **File | New** command.

Now use the **Insert** and **Edit** commands as usual to build the circuit on the figure above. Add the text "Calculate the current (I) through R." as well. You may want to include the "VG=..." and "R=..." texts as well, so that the student does not have to explore these values herself/himself. You may decide not to add the "Ohm's Law" text since it can be considered already to be an advice (hint). There is one particular component that is worth some special attention: the Ammeter. TINA will compute the value that should be displayed by the Ammeter, but won't display it in Train/Exam mode (as it would in Normal mode), instead, it will compare this to the value entered by the student. So it is a good idea to make sure that this value is some "nice" number (e.g. 3.75) and not some difficult-to-enter value, like 1.666666666... You can use the full analysis power of TINA to help your imagination to come up with such circuits. It is also important to note, that for these types of problems (DC and AC), there may be only **one** meter in the circuit: TINA will request the value of this meter.

Go to the **Advisor** tab on the Exam Manager and press the **Add** button. In the Edit Advice dialog enter "Use Ohm's law" without the quotation marks into the Advice box, and enter 10 into the penalty box. So now, when the student requests an advice she/he will be charged 10% for the first hint (a warning dialog will appear for the student). Press Add again, and enter "Ohm's law is: $U=I \cdot R$ ", and 40, respectively. Press Add once more, and enter " $I=VG/R$ ", and 35, respectively. Now after using all hints, the student still can score $100-10-40-35=15\%$ for entering the right answer (if the dimension is good as well).

At this point you may add additional text, and graphics, (but not circuit elements) to the circuit to further illustrate the question, at your liking.

You have finished editing this problem. Use the **File | Save** command to save the circuit in T:\TINA\TEST\4A-1998-11-06-Basic Electricity\DC.TSC.

4.2.2 TTASK

Press the **Add task** command button. Select the newly added task in the Task List Panel. TTask will display the task parameters in the Task Editing Panel.

In the **Name** field, enter "DC Problem" (without the quotation marks).

In the **File** field, click on the ellipsis (...) button and select the DC.TSC file just saved in TIN Again, please note the relative pathname.

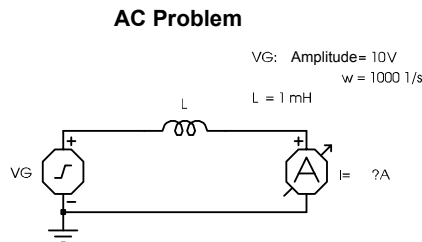
Set the **Type** to DC problem.

Check the **Advisor** checkbox.

Un-check the **Selection** checkbox.

You are done with this task. **Save** your work.

4.3 AC Problem



**Determine the complex current
through L (amplitude & phase).**

4.3.1 TINA

Execute a **File | New** command.

Now use the **Insert** and **Edit** commands as usual to build the circuit on the figure above. You have to handle the voltage generator with care (in order to get 10 A and -90 degree on the Ammeter): set DC level to 0, set Signal to Sinusoidal, and set (in the Signal Editor) Amplitude to 10 V, Frequency to 159.15 Hz ($159.15 \text{ Hz} \cdot 2 \cdot \pi = 1000 \text{ 1/s}$), and Phase to 90 degree.

At this point you may add additional text, and graphics, (but not circuit elements) to the circuit to further illustrate the question, at your liking.

You have finished editing this problem. Use the **File | Save** command to save the circuit in T:\TINA\TEST\4A-1998-11-06-Basic Electricity\AC.TSC.

4.3.2 TTASK

Press the **Add task** command button. Select the newly added task in the Task List Panel. TTask will display the task parameters in the Task Editing Panel.

In the **Name** field, enter "AC Problem" (without the quotation marks).

In the **File** field, click on the ellipsis (...) button and select the AC.TSC file just saved in TIN Again, please note the relative pathname.

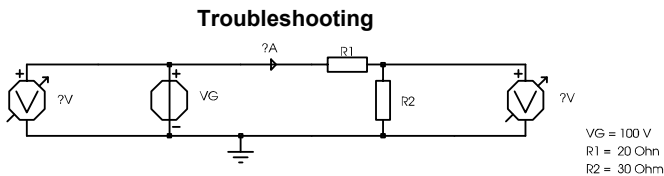
Set the **Type** to AC problem.

Un-check the **Advisor** checkbox (it is not a problem if you leave it checked, but it may be a good practice to turn this off if you don't have any advice hints in the circuit).

Un-check the **Selection** checkbox.

You are done with this task. **Save** your work.

4.4 Troubleshooting



Determine which component is faulty.

4.4.1 TINA

Execute a **File | New** command.

Now use the **Insert** and **Edit** commands as usual to build the circuit on the figure above. Before continuing, make sure that the circuit works as expected by using the Analysis features of TINA. It is always a good idea to design troubleshooting circuits in three steps: (a) design the good circuit; (b) fine-tune (debug) the good circuit; (c) add faults.

If we had an appropriate Test-card for this circuit, we could use the Map to hardware dialog to set the fault generator switches for the Original version now.

At this point you may add additional text, and graphics, (but not circuit elements) to the circuit to further illustrate the question, at your liking.

Now let's insert one fault. Go to Exam Manager, Fault Insertion, and from the **Current Circuit** list select **Version #1**. Please note, that all editing functions are disabled: you cannot edit the circuit in any version, except in the Original version. Click on the **Insert Fault** button, then click on R1. Let's set the Fault parameter to Short. Now, if we had an appropriate Test-card for this circuit, we could use the Map to hardware dialog to set the fault generator switches appropriately.

You can create additional faults at your liking, by repeating the steps (from setting the Current Circuit to a new Version) above.

You have finished editing this problem. Use the **File | Save** command to save the circuit in T:\TINA\TEST\4A-1998-11-06-Basic Electricity\Trouble.TSC.

You can exit TINA now.

4.4.2 TTASK

Press the **Add task** command button. Select the newly added task in the Task List Panel. TTask will display the task parameters in the Task Editing Panel.

In the **Name** field, enter "Troubleshooting" (without the quotation marks).

In the **File** field, click on the ellipsis (...) button and select the Trouble.SCH file just saved in TINA. Again, please note the relative pathname.

Set the **Type** to Troubleshooting.

Un-check the **Advisor** checkbox.

Un-check the **Selection** checkbox.

Check the "**Faults enabled**" **ON by default** checkbox: this way the student will see the faulty operation when she/he opens the problem.

Un-check the "**Faults enabled**" **locked** checkbox so that the student can study both the "good" and "bad" circuit versions.

Set **Faulty circuit** to Version #1 (the faulty version we have just created).

Un-check Circuit editing: right now we don't allow the students to add meters to the circuit.

You are done with this task and the whole authoring project. **Save** your work and exit TTask.

4.5 Preparations & Starting the Exam Session

Now that we have prepared the problem set, it's time to do an exam session. (It is probably good to test a new problem set with a small group of students to see if everything works as expected.)

Make sure that no one is using TINA in either training or examination mode.

Start **TSuper**. Execute the **File | Delete All** command. Select **File | Startup settings**, and in the configuration dialog **un-check** Normal and Training mode, and **check** Examination mode. Press OK. This way TINA can be started only with the /EXAM switch.

You may want to tune the evaluation rules at this time with the **File | Evaluation** command.

Before the students can start TINA there are some considerations that should be reviewed (mostly by the computer system/network administrator):

- students must have write permissions to the T:\TINA\EXAM directory
- students should not have permission to run the TTask and TSuper programs
- students should not have permission to modify files in the TINA directory tree (except for the EXAM subdirectory)

Now you can ask the students to start TINA in examination mode on their workstations by clicking on the Examination icon or selecting the appropriate option from the Start menu.

The Examination Logon dialog will appear. Each student should enter her/his own name. Now the Open Exam/Train Control File dialog will appear, with T:\TINA\TEST as the default directory (of course, where T:\TINA depends on your setup). Tell the students to open the "4A-1998-11-06-Basic Electricity\Exam.EXA" file and press OK.

Now the students can work on the problems. You will be able to monitor the students through TSuper's Class window.

At the end of the exam session ask all the students to **File | Exit** from TINA to properly finalize their exam results. After a short period of time, all the students' status will change to "Finished" in the Class window in TSuper. Now you can print out each student's result by double-clicking on the student in the Class window, and then while the student's detail window is active, by pressing the Print button..

After the exam is over, it is a good idea to archive the results for later reference. You can do this simply by copying the files in the T:\TINA\EXAM directory to a backup location. When doing so, please consider the privacy issues: don't copy the results to a publicly available directory. It is best to copy the results to floppies or to a secure private network directory.