IRSE
Institution of Railway Signal Engineers

IRSE Professional Examination

INFORMATION FOR STUDENTS

AUTHORISATION AND REVISIONS
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Contents

1. About the Examinations

You are advised to read the whole of this paper before embarking on your studies. It contains essential information on how to plan your studies and how to register for the examinations.

Some of the advice is fairly standard for exams everywhere; some is specific to the IRSE exam.

You must also read the Examination Regulations. The Regulations contain the rules that govern the examinations and the procedures that you need to follow.

The IRSE Examinations are designed to demonstrate that the student has reached the necessary professional educational standard required by a Signalling or Telecommunications Engineer for Corporate Membership of the Institution.

This standard is typified by the exercising of judgement in the preparation, assessment, amendment or application of specifications and procedures, and is applicable to personnel engaged in the following activities:

- Signalling /Telecommunications principles, practices, rules and regulations for the safe operation of railway traffic.
- Design and development of Signalling /Telecommunications equipment and systems
- Preparation and understanding of equipment drawings and specifications and / or design.
- Planning, site installation and testing of Signalling / Telecommunications equipment and systems
- Practices related to assembly, wiring and testing of Signalling /Telecommunications equipment and systems.
- Maintenance and servicing of Signalling/Telecommunications equipment and systems

In order to meet the examination requirements for corporate membership, candidates must obtain a pass in Module 1 plus **three** of the optional modules. **Note that the requirement to pass the modules within a five year period has now been removed.**

The following examination modules are currently available:

Module 1	Safety of Railway Signalling and Communications
Module 2	Signalling the Layout
Module 3	Signalling Principles
Module 4	Communications Principles
Module 5	Signalling & Control Equipment, Applications Engineering
Module 6	Communications Equipment, Applications Engineering
Module 7	Systems, Management & Engineering

The examinations are intended to test the main concepts of the subject material without bias to any one Railway practice.

2. The Thorrowgood Scholarship Award

The Thorrowgood Scholarship is awarded annually to a student member excelling in the Institution's Professional Examination. The award consists of the Institution's Thorrowgood Scholarship Medallion, and a cheque for £1500, which is presented at the Annual General Meeting of the Institution in the April following the examination.

The terms of the Thorrowgood bequest require that it should be utilised to assist the development of young engineers employed in the railway signalling and telecommunications field. A requirement of the award is that it is used to finance a study tour of railway and/or signalling installations or manufacturing facilities, usually in a foreign administration, and that the award holder presents a report about the study tour to the Younger Members Section.

To be eligible for the award students are usually expected to have sat the required four modules in the same year, and achieved outstanding results.

3. Planning your Studies

Having decided which Modules you wish to take, it is very important that you plan your study time.

Up to four Modules may be taken in one year, however this will necessitate a considerable amount of concentrated study. If you doubt that you will be able to find the time needed to prepare for four modules, prior to the next exam, you may prefer to plan your study over a longer period. As a rule of thumb you should plan your study period so that it does not have to be extended. It is better to be able to shorten your study period if your progress is faster than you originally estimated.

The purpose of the examination is to demonstrate that your technical knowledge of Signalling and Telecommunications in a railway environment has reached a professional standard. Cramming is likely to be counterproductive.

It is unwise to study for another qualification at the same time as you are studying for the IRSE Examinations as even where two syllabuses look similar the approach required may be different. For example, some courses teach you a particular skill and test your ability to apply that skill, whereas the IRSE examinations are about reasoning and test your analytical powers.

The examinations take place in October of each year. Map out your study objectives for the period between now and the date you intend to sit the examination. Study the exam syllabus in detail, considering your personal strengths and weaknesses and determine where extra preparation is required.

Discuss with your mentor, or other qualified engineer whose opinion you value, how to improve your knowledge in your areas of weakness. Maybe there is a specific work assignment, which would be of benefit. Give yourself milestones to be achieved in each month leading up to the examinations.

You will need to plan how to integrate your studies with your normal working life. To do this you will need to have a clear idea of how long different activities take. How long will it take you to read a given number of pages? How much additional time do you need to make notes? At what time of day do you work best? How easy do you find it to write? How much time do you need to plan what you are going to say?

Measure and plan what you intend to do and constantly review your progress. Discuss your difficulties with other students, if you know any. They will almost certainly be experiencing similar problems!

It is very helpful, where possible, if the hours given to studying are given consistently. It is a mistake to do too much as a certain amount of time is needed to allow you to absorb knowledge. Recreation time is also needed to keep you alert.

If there are periods where it is not possible to study you need not be discouraged as long as they are not too prolonged or too frequent.

It is likely that it will take you more time to study for the first one or two modules than it will for later modules. This is because you will be laying the foundations of both knowledge and study techniques during the early modules, which will be built upon during the later modules. Therefore do not worry if you initially take more time than you had originally intended at the beginning of your studies.

Find a place where you feel most comfortable and alert to study. Adequate light, freedom from noise and interruptions, a good working surface, easy access to books and files and the facility to leave them in place during breaks will all help you to make the most of your study time.

4. Study Techniques

The most important point about your reading is that it should be active rather than passive. It is not enough to simply learn and regurgitate material for the examiner. You will be asked to evaluate material and discuss the relationship between various theories and practice. In so doing you will need to actively think about the material and use it to answer the questions. Consider how different theories and practices relate to each other, and their strengths and weaknesses. In short, be active and analytical.

There is no substitute for making your own notes of key concepts, techniques, issues, arguments and references. Taking what you think is important and putting it into your own words is a powerful means of acquiring and developing your knowledge of a subject.

Essentially what you are doing is drawing on your existing ideas and knowledge in order to assimilate new facts and ideas. For this reason the actual process of note taking is as least as important as the final product.

The following points should help you when note taking:

- use your own words, copying text does little to help assimilate knowledge
- be selective in what you record, only brief salient points should be noted
- set out your notes to reflect the structure of the material that you are studying and the relationships between concepts
- underline or highlight key words
- your notes should be able to convey accurately the key concepts of what you have studied when referred to three or four months later on.

After finishing a block of reading, try to discuss it with other people who have previously sat for the exam. This will give you essential absorption time during which you can think the topic over for yourself and relate it to everything else that you have studied. It will also crosscheck your understanding. Never feel embarrassed about asking questions, even if you think that they may sound silly.

Right from the beginning of your studies you should practice writing answers to examination questions of the length that will be possible in the examinations. Ideally you should not allow a week to pass without undertaking some written work of this kind.

5. Practice Questions and Mock Examinations

Prepare and revise for the examination just as you would for any other. Revise your notes at the end of each week, and practice doing previously set examination questions with reference to your notes. Past examination papers together with ‘Model Answers’ are available from the IRSE. An order form and details are available on the website.

Later on, you should not use your notes, but should test yourself. Four weeks before the exam, select one set of past papers (which you have already seen) and try to answer them under exam conditions on a timed basis. The following week answer another set of papers which you have never seen before (save previously for this purpose).

Go through what you have written and test its grammar, style, reasoning and logical cohesion as well as its accuracy, then read through your notes and see what else you could have included. Ask your mentor or other qualified engineer to give you a critical review of your work.

Before you answer any questions it is important that you read the exam paper and plan your time in proportion to the marks available. Where choices are available, select the questions that you are going to answer. Plan your time so that you are able to answer the required number of questions and do not exceed the allocated time for each question. Attempt to answer **all** questions – by not answering the required number of questions you substantially reduce your chances of passing the exam. Once you have selected the questions that you are going to answer, there are four main stages to consider:

1. **Decide what the question means**. This is where marks are often needlessly lost. The exam committee goes to considerable trouble to rule out, as far as possible, any ambiguities in the questions and it is essential that you make quite sure that you understand exactly what question is being asked, then answer it. Don't answer a related question somewhere near the topic or the question that you wish had been set; you will not gain marks.

2. **Jot down your main ideas onto paper into note form.** It is a common fault amongst students to look for 'the right answer'. Very often there is no exactly right answer to a question; merely a range of topics, ideas or calculations which ought to be included in the answer. It is therefore essential that your answers are clear, concise and well reasoned. Peripheral to that, you also have the opportunity to put this information in its wider context but this must not be at the expense of the primary answer to the question.

3. **Turn these notes into the planned outline of your answer and allocate so many minutes to each, taking into account marks for each question.** As far as possible the questions set are judged to take an equal time to answer. Don't be misled into thinking that a short question requires a short answer. Some of the best questions consist of only a few words because they allow you to structure the answer to best advantage. Answer all parts of the question, as marks are available for each part.

4. **Write your answer summarising in your opening paragraph the structure of your argument.** Always make sure that your answer states any assumptions you want to make about railway authority safety standards, operating standards, signalling principles, signalling practices, circuit design standards, equipment choices or standard technologies from which you are quoting.

Candidates come from a number of different railways and it is therefore essential that assumptions are stated. One of the greatest sins (usually by UK candidates) is to state that the answer to a given question lies in a quoted standard (eg "see SSP 34" or "see CENELEC prEN50129"). It is good to show that you know the need for standards, but you should state the principle that is contained in the standards, and be critical of them.

Do not assume that the Examiner knows what your favourite abbreviations stands for. A professional approach means that you always write the abbreviation out in full and put the abbreviated version in brackets following it, the first time it is used, eg. As Low As Reasonably Practicable (ALARP). You can then use the abbreviation freely throughout the rest of the question, but you should define it again in any subsequent question. This is necessary because questions are often marked in a different order to that in which they are written, therefore each answer must stand on its own.

If the question calls for a diagram or sketch then you must include one or you will lose the marks that have been allocated to it. Even if the question does not specifically call for a diagram or sketch it is well worth including one if it will explain your ideas better. This is an exam in an engineering discipline and good diagrams are an essential part of engineering. Consider some of the useful ones which you might have the opportunity to use and practise drawing them quickly and legibly.

In any answer, which includes calculations, always set out the full workings so that your thought process is shown clearly. The exam committee understands that in the pressure of an exam, errors creep in which you would not normally make. If your workings show that you have arrived at an incorrect answer solely because of an arithmetical error or because you have manipulated an equation incorrectly, you will still be given full credit for setting out the principles involved.

6. Study Groups, Contacts and Networking

Studying without regular face to face contact with tutors is not easy. For this reason we strongly recommend that you join one of the many study groups. For a list of the current self help groups please visit our website at www.irse.org.

If there are currently no study groups within travelling distance, help and assistance can be provided to facilitate the setting up of a group local to your area.

Your local IRSE section meetings are a useful source of contacts and information as are the London Technical meetings. The Younger Members section also holds regular technical meetings. A younger member is defined as any member of the Institution who is still in their formative years of professional development. Meetings of the Younger Members Section are open to anyone.

To ensure the actual and perceived integrity and impartiality of the examinations you should not approach members of the Exam Committee for assistance between February and October of each year. (NB Examination scripts are only identified by the candidate number. Therefore members of the Exam committee are unable to identify individual candidates until after the results have been published.)

7. Access to Papers, Books and Periodicals

Details of recommended reading are provided in the published Reading List, which is updated periodically by the Examination Committee and is available on the website.

Many of the study groups will have all the resources and material that you will need for your studies.

Individual IRSE papers may be obtained from the IRSE at cost plus postage & packaging.

It is strongly recommended that you attend technical meetings and read the IRSE publication IRSE News as exam questions may revolve around topical issues. If you are unable to attend the technical meetings, the papers are published in IRSE News.

Please note that the IRSE is currently carrying out a review of its library provision and will publish details of the outcome when completed.

8. Using the Internet

The IRSE website (www.irse.org) is a good source of Examination information and also includes the following details:

- IRSE Local Sections
- The Overseas Sections

- Membership of the IRSE
- Younger Members Section
- Licensing
- IRSE Publications
- Forthcoming Events
- IRSE International Conference
- Contact Details
- Technical Meetings

Much information on railway signal engineering can be found with the help of good search engines, but be aware that some websites are more reliable than others.

9. Examinations

EXEMPTIONS

It is possible to obtain exemptions from individual modules (except module 1) where you can demonstrate that you have passed an examination by a recognised body, which has substantially covered the syllabus of a particular IRSE examination module. Due to the specialised nature of the IRSE Examination, the scope for exemption is fairly limited.

Claims for exemption must be made within five years of obtaining the particular qualification for which recognition is being claimed. When an exemption is granted it will always remain 'current'.

The most commonly sought after exemption is for Module 4. Many of the applicants for exemptions claim that Telecommunications has been part of their degree course and that, on this basis, exemption should be granted. Unfortunately it has been clear that the content of the Telecommunications element with a typical university Engineering Degree is at best a basic overview. Occasionally, students study a Telecommunications topic for their final year project, but these tend to be about a research topic narrowly specialising in a particular field and the Council is not convinced that such study justifies module exemption.

As a basis guideline, therefore, please do not ask for exemption to this module unless your study has been predominantly in Telecommunications. Please note that once an exemption is granted it will continue to be valid.

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ENTERING THE EXAMINATION

The Exam is held in October of each year. Please note that examination entry forms are not despatched automatically. If you intend to sit an examination in the forthcoming October, you should request a form or download one from IRSE's website in sufficient time for the completed application to be received before the application closure date of **30 June**.

In order to apply to sit an examination you must already be a member of the Institution at any grade or have lodged a completed application form with the Institution Membership Manager. Candidates are respectfully reminded that any subscriptions due must be paid before examination certificates will be issued.

The location of examination centres does vary according to demand, but they generally cover the following localities: Bristol, Birmingham, London Central, London South, York, Scotland, Hong Kong, Australia (NSW), Australia (WA), Australia (Queensland), Singapore, Thailand and United Arab Emirates. Depending on demand, additional centres may be set up. If there is no examination centre in your country, depending on the demand, one may be established. Please contact the London office if you would like to sit the examination in a country other than those listed.

TAKING THE EXAM

Whether you are taking just one module or spending the whole day being examined, make sure that you know exactly where you have to go, at what time you should arrive and the exact time each paper will start. This is particularly important if the location is one which you are not familiar with. Check to see if there any special security arrangements for access at the weekend which could delay you. Plan your journey so that you will arrive in good time to prepare for the exam. The stress of a last minute dash or a late arrival will mean that you will not be functioning effectively for the first part of the exam.

Check that you have all the equipment that you might require during the exam. It is advisable to take duplicate pens, pencils, scale rules, rubbers etc. and a spare calculator (non-programmable or database type) with new batteries. All the answer papers are photocopied so it is essential that you do NOT use colours in diagrams. Instead use different line thickness or styles and print sizes if you need to. Templates for circles and flow-charting are very useful as they enable neat diagrams and charts to be drawn very quickly, but do not bother with excessive neatness.

The first ten minutes of each paper will be a 'reading and thinking' period. This will enable you to:

- read the instructions carefully and make sure that you know how many questions you are expected to answer.
- read all the questions carefully and decide which ones you feel most competent to answer.
- plan exactly how long you are going to spend on each question
- use the remaining time to plan how you are going to structure the answer to your first question.

The main criticism from the Examination Committee is that many candidates do not read the question carefully, or fail to understand the question. You must answer the required number of questions. Failure to answer a question will result in no marks at all for that question.

You MUST begin the answer to each question on a separate piece of paper. Apart from the module number, the question number, your candidate number, the sheet number and the total number of sheets do NOT write anything else outside the box on the answer paper. Anything written outside the box could be missed by the photocopier.

If it is necessary to answer on a piece of paper that is not IRSE answer paper, eg graph paper, the module number, the question number, your candidate number, the sheet number and the total number of sheets must be written on it.

The exam is set in English and answers are required in English, however the Examiners do recognise that English is not the first language for some candidates. While no marks are deducted for incorrect grammar or unusual use of vocabulary, it is expected that the candidate can provide a clear explanation of what they mean. Questions will only give metric dimensions and figures, and the use of imperial measurements in answers from candidates will not be accepted.

The purpose of the exam is to communicate ideas. Although poor handwriting is not penalised, you are likely to get better marks if your handwriting is legible, simply because the examiner can read what is written.

Examiners are experienced in what candidates can be expected to achieve and recognise that candidates will not know all parts of the syllabus equally well. Please note that if, for

example, a topic happens to appear in an exam for three consecutive years, this does not mean it will also appear in the fourth year. For a three question paper, candidates will be wise to prepare six or seven topics thoroughly with two or three in reserve. In general topics are not discrete. An understanding of one part of a syllabus is almost always dependent on an understanding of the other parts.

When choosing which examination question to answer, make sure that you are confident that you can give a professional answer and that you answer the questions in the context of the paper ie questions in Module 3, Signalling Principles, need to be answered in relation to Signalling Principles. Don't forget to add a few lines of explanation when answering questions that require calculations.

Little bits of answers dashed off in the closing minutes rarely add significantly to your marks. You will benefit more by planning to leave a few minutes to read each question through carefully and correct any mistakes. If you recognise that the answer to a question is not correct, but do not have time to correct it, make a statement to that effect. The recognition of your error will be taken into account by the marker. You may wish to leave spaces throughout the answer to add any after thoughts, clarifications or definitions.

Remember that the ultimate purpose of the exam is to give you the opportunity to demonstrate that you are able to take a professional Engineer's approach and set your knowledge in its wider context. Whenever there is a borderline decision to be made, one of the questions asked is whether the candidate has demonstrated a professional understanding of the subject matter.

One final word - Examiners like passing candidates! Help them to help you.