



**THE INSTITUTION OF STRUCTURAL ENGINEERS**

**1 Chartered Membership (Part 3) Examination**

For the Chartered Membership (Part 3) examination there is a six strong team of Part 3 examination Advisers who are also members of the Examinations Panel and have served for a period of many years. This has produced a wealth of knowledge and expertise as well as ensuring continuity. The Advisers liaise throughout the year with the Chief Examiners and the Examinations Officer with regard to the production of the question papers.

In addition there are seven Chief Examiners who set the questions. The Chief Examiners are appointed from experienced Marking Examiners and are appointed for a four year cycle. They attend yearly assessment meetings over the four years so that they fully understand and can meet the requirements of the examination.

The Marking Examiners are invited each year to mark examination scripts. They must be senior practicing chartered structural engineers with relevant experience in the subject area of the questions they are to mark. The number of Marking Examiners required each year depends on the number of worked scripts but the last few years has required at least forty Marking Examiners. Each Marking Examiner is likely to mark approximately forty scripts within an eight week period following the examination. A trial examination script or a batch of scripts, if there is sufficient time between the examination date and the trial marking meeting date, are sent by courier to each Marking Examiner. These are sent before the meeting so that the Marking Examiners have time to digest the content of the examination question paper and to mark one of the scripts.

All Examiners attend a trial marking meeting which lasts the whole day and its purpose is for all those involved in the marking process to discuss and agree on marking schemes and to practice and develop general marking skills and techniques. At this meeting there is an introduction on general matters and methods, lasting about an hour. The Marking Examiners then divide into groups per question, each under its own Chief Examiner who explains the details of the question. Each Marking Examiner has been sent a photocopy of one of the scripts (chosen by their particular Chief Examiner as illustrating important points which will arise for markers) and is asked to mark it and bring it to the meeting. A comparison of the variety of marks that have been proposed is then made and any inconsistencies explained. Standards are set for the general marking in each part of the question. All these standards are chosen in relation to "what would be acceptable in a typical engineer's office".

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### *Chartered Membership (Part 3 Examination) Content*

The examination is set to an international standard, is seven hours long and is based on the measurement of competence. The questions set by the Chief Examiners are in the form of a design brief of exactly the kind which any structural engineer might meet in daily work. Each question is worded so that it requires the candidate to make the largest number of design decisions possible within the one working day available for the examination. In this way the examiners can test the full breadth of the candidates' skill, judgment, knowledge and understanding.

The examination has evolved and been refined over time. Great care is taken by the Chief Examiners (senior practicing engineers), to make all questions on any given paper of equal difficulty. Questions on a wide variety of topics are offered so that candidates experienced in steelwork, reinforced concrete, masonry, timber, offshore structures or bridges may find a suitable project on which to demonstrate their abilities. The Chief Examiners and Advisers pay particular attention to standard wording and equal demands in the questions. All questions are discussed on at least two separate occasions and are often revised and re-worded more than once. A bank of suitable topics for questions is prepared in advance so that proper rotation of topics can be made from year to year. The Institution has an international membership so candidates are informed that they may use any design code which is available in their normal practice as long as it is applied consistently.

### *Marking and Assessing the Examination Scripts*

The Institution's examinations have been held worldwide on the first Friday following Easter (normally April) for many years. Once the examination has taken place the examination scripts are returned to the Institution headquarters and checked against the nominal roll. Following the Trial Marking meetings (May), scripts are posted to each Marking Examiner in the UK by courier for security reasons. Each Marking Examiner will mark an initial batch of 20 scripts and then send them on to another Marking Examiner for a second set of marks. All marking examiners are linked in groups to ensure the double marking of all scripts. This process takes between 6-7 weeks to complete. All scripts are finally returned to Institution Headquarters after the exercise. Each set of mark sheets are input on to the customized examination program by the Examinations Officer, in time for a moderation of results meeting held over two days during late July.

### *Marking Process*

All scripts are marked independently by two Marking Examiners (Chartered Structural Engineers) who do not write anything on the script. The performance of all examiners is monitored by calculating statistics like their mean mark and standard deviation in each part of the examination. These are used to normalize the marks awarded so that they become those of "the average examiner". The marks of every examiner are thus adjusted so that the printed broadsheet of marks considered by the Panel at the end of

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the process shows four sets of marks for each candidate, two examiner's raw marks and derived from them two versions of what "the average examiner" would have awarded. This produces the average mean mark and the average standard deviation of all the examiners in every question.

The two sets of marks, raw and normalised are usually quite close together engendering confidence in the procedure. The computer used in the calculations prints out two versions of the broadsheet, one in candidate number ranked order for administrative checking and one in ranked order of merit, question by question. The Examinations Officer has to input all the raw marks and check every one before proceeding to normalising the marks through the computer program and prior to the moderation of results meeting.

### *Moderation of Results Meeting*

The Examination Advisers begin to moderate every script on the evening before the main results day. This is to assist in identifying scripts for adjudication which must be left to the Chief Examiner to make the final decision on the following day. Hence at the actual day meeting itself, all doubtful cases have been noted and scripts have been assigned for adjudication. On the results day, the Chief Examiners are present and proceed to adjudicate those scripts that have been assigned with some assistance from the Advisers. At this meeting any letters from candidates asking for "special consideration", whether on medical grounds or because of an incident on the examination day that has allegedly affected performance, have been already noted in advance. The circumstances are taken into account as each script is moderated. A mark of 40%, which is linked to the level "just acceptable in a typical practice" is normally required in each part of the paper for the candidate to pass overall.

### *Rules for Compensation*

The Panel also uses a set of six rules for guidance when moderating the script. A candidate might clearly pass in every respect by both examiners or might be passed by compensation, for example when narrowly failed by one examiner but clearly passed by the other, or when the candidate narrowly fails in one part of the paper but has a large excess of marks in another. The same is done separately for the set of normalised marks. Compensation is only applied when at least one examiner shows a mark awarded by the two independent examiners in the following circumstances:

#### **Rule 1**

Both Examiners pass the candidate in both parts of the paper. The candidate will be passed with the designation PASS on the examination broadsheet.

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### **Rule 2**

One examiner passes the candidate but the other awards fewer than 40% in one of the two parts of the paper. If that examiner awards an excess of marks in the other part of the paper at least twice as large as the deficiency, the candidate will pass with the designation P(C1). This compensation is limited to a deficiency of 3% or less.

### **Rule 3**

One examiner passes the candidate but the other does not within the 3% limit. If the overall marks awarded by the two examiners are at least 85% in total, the candidate will pass with the designation P(C2). This protects the candidate against an unduly harsh decision when the other examiner awards a large excess of marks in both parts of the paper.

### **Rule 4**

The normalised marks of both examiners pass the candidate in both parts of the paper. The candidate will be passed with the designation PASS on the examination broadsheet.

### **Rule 5**

The normalised marks of one examiner pass the candidate but those of the other award fewer than 40% in one of the two parts of the paper. If the normalised marks of that examiner give an excess of marks in the other part of the paper at least twice as large as the deficiency, the candidate will pass with the designation P(C1). This compensation is limited to a deficiency of 3% or less.

### **Rule 6**

The normalised marks of one examiner pass the candidate but the other does not within the 3% limit. If the overall normalised marks are at least 85% in total, the candidate will pass with the designation P(C2).

The broadsheet shows which of the six rules applies, and, independently for both sets of marks, whether the candidate would be passed or failed overall if the rules had been numerically applied with no other consideration. Up to 23 warnings that a candidate's script should be adjudicated may, however, also be printed on the broadsheet against candidates' marks. Typical warnings are as follows: one examiner has awarded marks which differ by more than 10 from the other in Part 1, one or both examiners consider that the structure is unstable. This would result in an automatic failure point being awarded if upheld by the Chief Examiner during adjudication. One examiner has awarded fewer than 35 marks in total whilst the other has awarded more than 50. All these adjudication warnings are considered and assessed at the meeting for the moderation of marks, by the Chief Examiner concerned, and the reporting of his opinion to the rest of the Panel for a final review.

### *Feedback to Candidates and Marking Examiners*

Feedback to failed candidates is provided by each of the two marking examiners indicating briefly how the candidate might improve their performance. These

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examiners' remarks are conveyed to failed candidates in the results letter and "message from your examiners" which they receive from the Institution during August.

The result letter includes the point that it would not be appropriate for the Institution to enter into any correspondence about an individual's performance in its qualifying examinations and the Institution's Council has resolved that "no other information regarding the work of a candidate other than that provided shall be given", The Examinations Panel is constantly reviewing this topic of feedback to candidates.

The Marking Examiners also receive feedback about their own performance relative to other markers. They each receive a confidential letter which lists statistics like their own mean and standard deviation in each part of the paper, the average mean and standard deviation of all markers overall, their own percentage pass rate and the overall pass rate, their product moment correlation coefficient which indicates the way they rank candidates relative to the other markers, and so on. This exercise is done to encourage Marking Examiners to modify their marks year by year towards those of the "average marker".

### **2 Associate Membership Written Examination**

There are two Associate-Member Advisers who are also members of the Examinations Panel. They are responsible for overseeing the content and production of the written paper. Four Chief Examiners develop each question, with the assistance of the Advisers and the Examinations Officer, to the production stage. At present the Associate-Membership examination is attempted by approximately 30 to 40 candidates each year and requires only single marking for the four questions. The current Marking Examiners are approved and invited to mark both examinations.

There is a trial marking meeting for the Associate-Membership examination which is similar in aim to the Chartered Membership (Part 3), the production of marking schemes, discussion between examiners involving the current scripts and guidance on marking provided by the Advisers.

All scripts are currently marked once by an assigned Marking Examiner with the raw marks recorded on the computer system. The double marking of examination scripts was introduced from the April 2001 examination onwards.

The moderation of results takes place slightly earlier during July than the other examination. Two Advisers are present to moderate every script with the aid of the raw marks and comments from Marking Examiners. Any correspondence from candidates is taken into account during the moderation.

#### *Examination Content*

The examination is set to an international standard and is six hours long. The candidate has to consider the details of a construction project presented to him/her in much the same way that a brief and proposed design solution would be passed to the design office by a Chartered Structural Engineer. The candidate is required to answer a written

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question about the selected project with the question being divided into two parts: the first designed to test knowledge of structural engineering design practice (including drawing and detailing) to convey design information to the site; the second is to establish that the candidate is familiar with the Incorporated Engineer's normal responsibilities for managing and organising construction processes in a structural engineering office.

### **3 Associate-Membership (Oral Examination)**

The Associate-Membership Oral examination is a one hour test of practical and theoretical knowledge which is conducted on the basis of project work submitted by the candidate. It is available to applicants with the appropriate academic qualifications for Associate-Membership/IEng registration who are aged 35 years old when they take the examination. The project submission must be the candidate's own work and demonstrate a standard of knowledge, understanding and application of structural engineering not less than that required in the written examination. The guidelines for the candidates are attached at Annex 19.

The Oral examination is divided into two major parts, the first dealing with the structural principles, calculations and working details and the second covering aspects related to the construction, maintenance and costing of the works.

The Oral examinations are held bi-annually in January and July at the Institution Headquarters. Once an interview date has been agreed the candidate is invited to Institution Headquarters where the two Associate-Member Examination Advisers conduct the candidates' oral examination. On completion of the examination a report is made to the Examination's Panel. Candidates are informed within two to three weeks if they have satisfied the examiners. A copy of a pass letter is sent to the Membership Secretary so that the candidate can proceed to election as an Incorporated Engineer AMIStructE through the committee structure. When a candidate fails the examination, a letter will be provide indicating the general area of failure. There must be a period of at least 12 months before the candidate is allowed another attempt and the project must be different to the one previously submitted.

### **4 Appeals Procedure**

#### Overview

All candidates who attempt the Institutions' Chartered Membership (Part 3) examination or the Associate-Membership Examinations are entitled to appeal against the decision of the Institution on the following grounds:

- Extenuating circumstances that were not considered during the assessment process
- Departure from the Institution's examination assessment procedures.

The Appeals Procedures document (Annex 20) gives the full and detailed steps for any candidate who wants to appeal regarding his examination result.

**ANNEX 20 CONTINUES ON NEXT PAGE**



**THE INSTITUTION OF STRUCTURAL ENGINEERS**

**Associate Member (AM) and Chartered Member (CM) Examination Results**

**Grounds for an Appeal**

All candidates who have attempted the Associate Member or the Chartered Member examination and have failed to pass are entitled to appeal against the decision of the Institution on the following grounds:

- (a) Extenuating circumstances that were not considered during the assessment process.
- (b) Departure from the Institution's examination assessment procedures.

In all cases the candidate must provide written supporting evidence to substantiate the grounds for their appeal.

In the case of a candidate intending to lodge an appeal citing extenuating circumstances occurring immediately before or during the examination, details of the circumstances, including any supporting evidence, must normally be submitted in writing to the Chief Executive within 30 days of the examination. Any extenuating circumstances referred to by a candidate without prior written notification will not normally be considered as grounds for an appeal.

The Institution has developed a robust and rigorous process for assessing the performance of candidates in the Associate Member and Chartered Member examinations. The process, which has been in operation for many years and is described elsewhere, is overseen by the Examinations Panel and is subjected to the Institution's Quality Assurance procedures. The Institution considers that such measures reduce the chances of error in the assessment process to an insignificant level. Accordingly, although candidates may feel that their examination paper may have been incorrectly assessed, such opinions are not considered to be grounds for an appeal and will not normally be considered by the Institution.

**Appeals Procedure**

1. All appeals must be submitted in writing to the Chief Executive of the Institution within 30 days of receipt of the examination results. Appeals received after this date will not be considered.
2. The Chief Executive (or, in his or her absence, the Deputy Chief Executive) will review the appeal within 30 days of its receipt to decide if a prima facie case exists for a review of the original decision of the Institution.

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3. If a prima facie case is deemed not to exist, the appeal will be rejected. The candidate will be informed of this decision by the Chief Executive within 30 days of receipt of the appeal.
4. If a prima facie case is deemed to exist, the appeal will be referred to the Examinations Panel. The appeal will be considered at the next scheduled meeting of the Examinations Panel following the referral by the Chief Executive (or the Deputy Chief Executive).
5. The Examination Panel will consider the appeal and report its decision to the Chief Executive and the Chair of the Membership Committee. The Chief Executive will inform the candidate of the outcome of the appeal within 30 days of the Panel meeting.
6. If the candidate remains dissatisfied at the outcome of their appeal, he or she has the right of a further appeal. In such cases, the candidate must write to the President within 30 days of the date cited on the letter notifying the candidate of the outcome of the previous appeal. Further appeals received after this date will not be considered.
7. On receipt of the further appeal, the President will appoint an Appeals Panel to consider the candidate's performance in the light of the grounds cited by the candidate. The Appeals Panel will consist of 3 Fellows of the Institution who are not directly connected with any aspect of the examination assessment process.
8. The Appeals Panel will consider the further appeal within 90 days of its receipt and will report its decision to the President, the Chief Executive and the Chair of the Membership Committee. The Chief Executive will notify the candidate of the outcome of the further appeal within 30 days of the meeting of the Appeals Panel.
9. The decision of the Institution's Appeals Panel is final.