

# Changes to the Associate

## Introduction

In 2003 significant changes were made to the form of the Associate Member (AM) examination. The primary object was to place greater emphasis on the development of conceptual design solutions. These changes were described in detail at the time in *The Structural Engineer*<sup>1</sup>.

Since then, the AM examination has been successfully implemented in the years from 2003 to 2007. The Institution has however received some feedback from the membership that the examination is too similar to the Chartered Membership (CM) examination. The Membership Committee Panel of the Institution therefore asked the Examinations Panel to undertake a review of the differences between the two examinations and consider if any modification to the AM examination is needed. This note summarises the findings of the review.

## Review of AM and CM Examinations

To provide a framework for the review the panel considered the competency standards set out in the Engineering Council's publication, *UK Standard for Professional Engineering Competence – Chartered Engineer and Incorporated Engineer Standard*<sup>2</sup>. Table 1 contains a comparison of the competencies for Chartered Engineers (CEng) and Incorporated Engineers (IEng), as defined in the Engineering Council publication. As would be expected there are significant similarities in the competencies required of the two grades of engineer, depicted in blue text in the table. However there are some specific differences which are depicted in red text. In the context of the AM and CM examinations, the key differences are:

- CEng optimise the application of technology while IEng apply technology
- CEng engage in creative and innovative development of technology while IEng use an evidence based approach to problem solving
- CEng are involved in engineering activities at a high level while IEng are involved in the more detailed aspects

The panel compared the current AM and CM examinations to confirm the specific differences between the examinations and identify which of the above competencies the examinations are effectively testing. This comparison is set out in Table 2. The commentary in the right hand column of the table confirms that whilst the examinations could be viewed as being superficially similar, there are fundamental differences which are broadly aligned with the principles of the

*Table 1: Comparison of CEng and IEng Competencies*

Competency	Chartered Engineers (CEng)	Incorporated Engineers (IEng)	Differences
A	Use a combination of general and specialist engineering knowledge and understanding to <b>optimise the application of existing and emerging technology.</b>	Use a combination of general and specialist engineering knowledge and understanding to <b>apply existing and emerging technology.</b>	CEng – Optimise the application IEng – Apply
A1	Maintain and extend a sound theoretical approach in <b>enabling the introduction and exploitation of new and advancing technology and other relevant developments.</b>	Maintain and extend a sound theoretical approach <b>to the application of technology in engineering practice.</b>	CEng – Introduce and exploit new and advancing technology IEng – Apply technology
A2	<b>Engage in the creative and innovative development of engineering technology and continuous improvement systems.</b>	Use a sound evidence-based approach to <b>problem-solving and contribute to continuous improvement.</b>	CEng – Creative and innovative approach IEng – Sound evidence-based approach
B	Apply appropriate theoretical and practical methods <b>to the analysis and solution of engineering problems.</b>	Apply appropriate theoretical and practical methods to <b>design, develop, manufacture, construct, commission, operate and maintain engineering products, processes, systems and services.</b>	CEng – High level IEng – Detailed
B1	<b>Identify potential projects and opportunities.</b>	Identify, review and select techniques, procedures and methods to <b>undertake engineering tasks.</b>	CEng – High level IEng – Detailed
B2	<b>Conduct appropriate research, and undertake design and development of engineering solutions.</b>	<b>Contribute to the design and development of engineering solutions.</b>	CEng – Conduct IEng – Contribute
B3	<b>Implement design solutions, and evaluate their effectiveness.</b>	Implement design solutions and <b>contribute to their evaluation.</b>	CEng – Evaluate IEng – Contribute
C	Provide technical and commercial <b>leadership.</b>	Provide technical and commercial <b>management.</b>	CEng – Lead IEng – Manage
C1	Plan for effective project implementation.	Plan for effective project implementation.	None
C2	<b>Plan, budget, organise, direct and control tasks, people and resources.</b>	<b>Manage the planning, budgeting and organisation of tasks, people and resources.</b>	CEng – Lead IEng – Manage
C3	<b>Lead</b> teams and develop staff to meet changing technical and managerial needs.	<b>Manage</b> teams and develop staff to meet changing technical and managerial needs.	CEng – Lead IEng – Manage
C4	<b>Bring about continuous improvement through quality management.</b>	<b>Manage continuous quality improvement.</b>	CEng – Lead IEng – Manage

Engineering Council competencies.

Based on the preceding comparison of the competencies required of IEng and CEng, and comparison of the current AM and CM examinations, the panel concluded that:

- The basic form of the AM examination is fit for the purpose of testing the competencies required of an Incorporated Engineer and should not be fundamentally changed.
- For the AM examination, the specific prob-

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lems set each year should focus on conventional structural engineering designs that would be routinely encountered in professional practice, leaving more challenging problems that require a higher level of conceptual design development to the CM examination.

- Whilst it is important that the AM examination should continue to include conceptual design, the mark allocation should be adjusted to reflect the conceptual design needed for conventional structures and to focus more attention on the detailed design aspects of the question.
- Consideration was given to reducing the time allowed for the AM examination but it was concluded that the current 7 hours should remain unchanged.
- No changes should be made to the CM examination but there should be a movement towards more open questions such as the crocodile tank question that was set in the 2008 CM examination.

The findings were reported to the Membership Panel and it was agreed that the following changes should be made to the AM examination. These will apply to the examination in April 2009.

## Change 1

The number of questions offered in the AM examination will be reduced from six to four. These will focus on conventional structures that would be routinely encountered in professional practice. Each question will be dedicated to a generic type of structure, which should give all suitably experienced candidates the opportunity to demonstrate their capability in structural engineering.

**Question 1** – A typical commercial or residential building comprising a routine frame structure eg office, apartments, hotel, car park that could be designed to be constructed in either concrete or steel.

**Question 2** – A typical larger span building of portal or similar construction e.g. industrial building, leisure centre, swimming pool that could be constructed in either concrete or steel.

**Question 3** – A typical civil engineering structure e.g. bridge, underpass, tunnel, jetty. Ideally it should be possible to design the structure in concrete or steel, although this may not always be feasible.

**Question 4** – A smaller scale building that could be designed to be constructed in a range of materials, including masonry and timber.

There will be no element of challenge in the

Section	Chartered Member (CM)	Associate Member (AM)	Commentary
1a	Prepare a design appraisal indicating two distinct and viable solutions for a scheme to meet the client's requirements. The appraisal should include: <ul style="list-style-type: none"> <li>• Functional framing</li> <li>• Load transfer</li> <li>• Stability</li> </ul> Recommend solution giving reasons for choice.	Prepare a design appraisal indicating a viable solution for a scheme to meet the client's requirements. The appraisal should include: <ul style="list-style-type: none"> <li>• Functional framing</li> <li>• Load transfer</li> <li>• Stability</li> </ul> Justify reasons for solution.	CM candidates develop two solutions to meet a relatively challenging brief and need to demonstrate a higher level of judgment in recommending a solution from two options. AM candidates develop a single solution for a more routine brief with less challenge, although the proposed solution is required to be justified. Mark allocation of 40 for CM and 25 for AM examination reflects the greater focus on scheme development in the CM examination. Tests Competencies A2, B1, B2 and B3.
1b	Letter to the client that explains how an issue affects the design of the proposed solution and how the issue can be resolved.	Explanation of how an issue affects the design of the proposed solution and how the issue can be resolved.	Requirements are similar but a CM candidate will not receive full marks unless a properly structured letter is produced. Mark allocation of 10 is the same for both examinations. Tests Competencies A2 and B3.
2c	Calculations for key elements.	Calculations for key elements.	No difference in requirements. Mark allocation of 20 for CM and 30 for AM examination reflect the greater focus on design calculations in the AM examination. Tests Competencies B2 and B3.
2d	General arrangement plans sections, elevations and critical details for estimating purposes.	General arrangement plans sections and elevations for estimating purposes. Sketches of two specific details.	Requirements are similar but CM candidates must identify critical details. Mark allocation of 20 for CM and 25 for AM examination reflects the greater focus on drawings in the AM examination. Tests Competencies B2 and B3.
2e	Method statement for the safe construction of the works and construction programme.	Method statement for the safe construction of the works.	CM candidates are required to produce a construction programme in addition to a method statement. Mark allocation of 10 is the same for both examinations. Tests Competencies C1 and C2.

specific problem set that is beyond routine design and construction.

## Change 2

The format of the questions will remain unchanged. However, there will be a small change in the marks allocated to the various sections and sub-sections. The new allocation will be

1a	20
1b	10
2c	30
2d	30
2e	10

There will therefore be 30 marks for the conceptual design aspects contained in Part 1 and 70 marks for the detailed aspects of the question contained in Part 2. Candidates will still be required to obtain a pass mark in both parts.

## Advice to potential candidates

The above changes should not impact on any examination preparation that candidates planning to sit the AM examination 2009 are undertaking or intending to undertake. For example practising past papers from between 2003 and 2008 is still entirely relevant except for the small change in mark share which will require an adjustment of time allocation. **se**

## References

1. The new Associate Member (AM) and Chartered Member (CM) examinations, *The Structural Engineer*, 81/2, 21 January 2003
2. *UK Standard for Professional Engineering Competence – Chartered Engineer and Incorporated Engineer Standard*, Engineering Council UK, Reprinted in 2005