



Question Paper Brief

Advanced Higher Mathematics of Mechanics C702 77

This edition: March 2016 (version 1.1)

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Question Paper Brief — Advanced Higher Mathematics of Mechanics

The Course assessment consists of one question paper which will assess:

- ◆ the knowledge and understanding of a range of straightforward and complex concepts in mechanics
- ◆ the ability to identify and use appropriate techniques in mechanics
- ◆ the ability to use mathematical reasoning and operational skills to extract and interpret information
- ◆ the ability to create and use multifaceted mathematical models
- ◆ the ability to communicate identified strategies of solution and provide justification for the resulting conclusions in a logical way
- ◆ the ability to comprehend both the problem as a whole and its integral parts
- ◆ the ability to select and use numerical skills

The question paper will sample the 'Further mandatory information on Course Coverage' in the *Course Assessment Specification*. This sample will draw on all of the skills, knowledge and understanding from each of the following areas:

- ◆ principles of momentum, impulse, work, power and energy
- ◆ motion in a horizontal circle with uniform angular velocity
- ◆ simple harmonic motion
- ◆ centre of mass
- ◆ motion in a straight line
- ◆ vectors associated with motion
- ◆ projectiles moving in a vertical plane
- ◆ forces associated with dynamics and equilibrium
- ◆ partial fractions
- ◆ calculus skills through techniques of differentiation
- ◆ calculus skills through techniques of integration
- ◆ solving differential equations

Command words are the verbs or verbal phrases used in questions and tasks which ask candidates to demonstrate specific skills, knowledge or understanding. For examples of some of the command words used in this assessment, refer to [the Specimen Question Paper and the Exemplar Question Paper](#).

The Course assessment will consist of one question paper:

| | Question paper |
|---|---|
| Time | 180 minutes |
| Marks | 100 |
| Skills | <p>The question paper will give candidates an opportunity to apply mathematical techniques and skills to principles of momentum, impulse, work, power and energy; motion in a horizontal circle with uniform angular velocity; simple harmonic motion; centre of mass; motion in a straight line; vectors associated with motion; projectiles moving in a vertical plane; forces associated with dynamics and equilibrium; partial fractions; calculus skills through techniques of differentiation; calculus skills through techniques of integration; and solving differential equations as specified in the table provided in the 'Further mandatory information on Course coverage' section at the end of the <i>Course Assessment Specification</i>.</p> <p>The question paper requires candidates to demonstrate aspects of breadth, challenge and application in appropriate contexts for Mathematics of Mechanics. The use of a calculator will be permitted.</p> |
| Percentage of marks across the paper | <p>Approximately 25–45% of the overall marks relate to Force, Energy and Periodic Motion.</p> <p>Approximately 25–45% of the overall marks relate to Linear and Parabolic Motion.</p> <p>Approximately 25–45% of the overall marks relate to Mathematical Techniques for Mechanics.</p> |
| Type of question | The question paper will consist of a series of short response questions and extended response questions set in contexts that require the application of skills developed in the Course. Candidates will be expected to communicate responses clearly and to justify solutions. |
| Type of question paper | Unstructured: question paper and separate answer booklet. This will allow sufficient space for extended working and open responses. |
| Proportion of level 'C' questions | Many questions will use a stepped approach to ensure that there are opportunities for candidates to demonstrate their abilities beyond level 'C'. Approximately 65% of the marks will be available for level 'C' responses. |
| Balance of skills | Operational and reasoning skills will be assessed in both question papers. Some questions will assess only operational skills (approximately 65% of marks) but other questions will require both operational and reasoning skills (approximately 35% of marks). |

Administrative information

Published: March 2016 (version 1.1)

History of changes to Question Paper Brief

| Version | Description of change | Authorised by | Date |
|---------|---|------------------------|------------|
| 1.1 | References to binomial theorem deleted. | Qualifications Manager | March 2016 |
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