

[ENG22]

UNIVERSITY OF BOLTON

SCHOOL OF ENGINEERING

**BSC (HONS) FACILITIES AND BUILT ASSET
MANAGEMENT**

SEMESTER ONE EXAMINATIONS 2023/24

**SUSTAINABLE TECHNOLOGY AND PRODUCT
INNOVATION**

MODULE NO: IDCE6003

Date: Monday 8th January 2024

Time: 10:00 – 12:30

INSTRUCTIONS TO CANDIDATES:

This exam paper contains **SIX** questions

Answer **ANY FOUR** questions

All questions carry equal marks

Marks for parts of questions are shown
in brackets.

This examination paper carries a total of
100 marks.

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Question 1

Introduction to Modern Methods of Construction (MMC) in Facilities Management

(a) Define MMC in the context of facilities management.

5 marks

(b) Examine the key principles and advantages that MMC brings to the construction and management of facilities.

15 marks

(c) Provide examples of MMC techniques commonly used in the industry.

5 marks

Total 25 marks

Question 2

Integration of MMC and Sustainability

(a) Explore the relationship between MMC and sustainability in facilities management.

10 marks

(b) How do MMC practices contribute to environmental sustainability, and what are the considerations that facilities managers should take into account when implementing MMC to align with sustainable practices?

15 marks

Total 25 marks

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Question 3

Cost-Benefit Analysis of MMC in Facilities Management

- (a) Conduct a cost-benefit analysis comparing traditional construction methods with MMC in the context of facilities management. 5 marks
- (b) Analyse the potential cost savings and efficiency improvements associated with MMC. 10 marks
- (c) What challenges might be encountered, and how can they be addressed? 10 marks

Total 25 marks

Question 4

Technology Integration in MMC

- (a) Examine the role of technology in the implementation of MMC. 5 marks
- (b) How can emerging technologies such as Building Information Modelling (BIM) and automation enhance the efficiency and effectiveness of MMC in facilities management? 10 marks
- (c) Provide examples and discuss potential challenges. 10 marks

Total 25 marks

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Question 5

Regulatory and Compliance Considerations

- (a) Analyse the regulatory and compliance aspects associated with the adoption of MMC in facilities management.

10 marks

- (b) How do MMC techniques align with building codes and standards?

5 marks

- (c) Examine any potential legal or regulatory challenges that facilities managers should be aware of when implementing MMC.

10 marks

Total 25 marks

Question 6

Case Study Analysis

Using the following fictional case study where MMC have been successfully applied from a facilities management perspective, give details of the specific methods potentially used and analyse the various aspects, identify and appraise the challenges the developer and stakeholders would have faced and the likely outcomes achieved. Appraise the lessons learned from the case study and provide recommendations for other facilities managers considering similar approaches.

Total 25 marks

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Case Study: Pinnacle Heights - A Modern Approach to Student Accommodation

In the bustling university town of Coventry, UK, the demand for student accommodation has surged with the increasing student population. Pinnacle Heights, a prominent property development company, undertook the ambitious project of constructing a state-of-the-art student accommodation facility using MMC.

Background:

Pinnacle Heights recognised the need for innovative solutions to address the growing demand for student housing while maintaining sustainability and efficiency. The company aimed to set a new standard in the industry by integrating MMC into the construction of Pinnacle Residences which was a four-story accommodation complex.

MMC Techniques Implemented:

The construction team at Pinnacle Heights embraced various MMC techniques to expedite the project and enhance its environmental footprint. Prefabricated modular units were manufactured off-site, reducing construction time significantly. These units, equipped with cutting-edge smart home technology and energy-efficient features, were assembled on-site like building blocks, minimising disruption to the surrounding area.

Challenges Faced:

Despite the promising advantages of MMC, the project encountered challenges typical of pioneering ventures. Planning and Building Regulations were considered in the context of the forthcoming Building Safety Act and Pinnacle Heights had to work closely with regulatory bodies to ensure compliance. Additionally, securing skilled labour familiar with MMC techniques posed a challenge, necessitating collaboration with training programs to upskill workers.

Outcomes and Achievements:

The implementation of MMC at Pinnacle Residences resulted in many positive outcomes. The project was completed 30% faster than a traditional build, showcasing the efficiency of MMC in meeting tight deadlines. The smart home features reduced energy consumption, aligning with sustainability goals and earning the facility high praise for its environmental considerations.

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Lessons Learned:

The Pinnacle Heights team gleaned valuable insights from the project. Clear communication and collaboration with local authorities were critical for navigating regulatory complexities. The company also recognised the need for continued investment in workforce training to ensure a skilled labour pool capable of handling MMC projects effectively.

Recommendations for Future MMC Projects:

Based on the Pinnacle Residences experience, Pinnacle Heights offers recommendations for future MMC projects. First and foremost, comprehensive planning and collaboration with regulatory bodies are essential. Early engagement with the local community and transparent communication about the benefits of MMC can help garner support and address concerns.

The developer concludes that their first venture into MMC for student accommodation serves as an inspiring case study. The successful completion of Pinnacle Residences highlights the potential of MMC to revolutionise the construction industry, particularly in meeting the demands of fast-paced urban development and forthcoming 'smart cities'. They consider the lessons learned and subsequent recommendations contribute valuable insights for future MMC projects in the UK and beyond, marking a significant milestone in the evolution of modern construction practices.

END OF CASE STUDY

END OF PAPER