

**MANAGEMENT OF CONSTRUCTION PROCESSES
AND TECHNIQUES**
(21CVP326)

Semester 2 2021-22

In-Person Exam paper

This examination is to take place in-person at a central University venue under exam conditions. The standard length of time for this paper is **3 hours**.

You will not be able to leave the exam hall for the first 30 or final 15 minutes of your exam. Your invigilator will collect your exam paper when you have finished.

Help during the exam

Invigilators are not able to answer queries about the content of your exam paper. Instead, please make a note of your query in your answer script to be considered during the marking process.

If you feel unwell, please raise your hand so that an invigilator can assist you.

You may use a calculator for this exam. It must comply with the University's Calculator Policy for In-Person exams, in particular that it must not be able to transmit or receive information (e.g. mobile devices and smart watches are **not** allowed).

Answer **THREE** questions.

Answer **ONE** question from each of the **Sections A, B and C**.

Please use a separate answer book for each section.

All questions carry equal marks.

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SECTION A

(Answer **ONE** question from this section)

1.
 - a) By drawing on Doblin's innovation archetypes discuss the essential features that should be given due consideration when contemplating the introduction of innovation in construction projects by contractor and client organisations. [20 marks]
 - b) Construction companies often argue that the project nature of their operations often militates against the adoption of innovation. Discuss any four factors that the industry often put forward as a justification for their position of non-adoption of innovation. [13 marks]
2.
 - a) By drawing on an appropriate example, provide an argument to justify why the use of only product-moment risk is inadequate for infrastructure developments. [5 marks]
 - b) Propose and discuss an alternative concept for measuring risk that addresses the limitation of the product moment concept of risk. [5 marks]
 - c) A consulting company needs to establish its risk exposure for the design of a reinforced concrete multi-storey car park in Nottingham. Critical to the design is the integrity of the foundation and basement levels of the structure which susceptible to flooding. The senior design engineer has indicated that any potential damage to the basement of the structure could result in contamination to the ground within the vicinity of the structure. Based on a previous development of such a structure with similar capacity designed and installed in Derby by your company, the estimate for correcting any damage to the basement level could rise up to £650,000.00. However, the likelihood of such a damage is estimated at 1 in 25.
 - i) Calculate and justify the maximum objective risk that should be associated with development of the multi-storey car park. [7 marks]
 - ii) If the chances of the design for the basement of the structure being breached changes to 1 in 12, what contingency provision should be adopted by the project and why? [6 marks]
 - iii) As a result of the flooding for the project in Derby, the local residents had compensation claims that run up to £3.6 Million. Propose and justify the level of subjective risk that the company should consider for the development? [10 marks]

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SECTION B

(Answer **ONE** question from this section)

3. a) Provide a critical evaluation of the differences between 'project management' and 'management of projects' and reflect on the appropriate skills for each. [12 marks]
- b) Identify and describe four key lessons learnt from the management of the Crossrail megaproject. [8 marks]
- c) Projects exist to fulfil the strategic mission of an organisation/company. Using an appropriate illustration, discuss how the strategic drivers of differentiation and efficiency of the production process relate to the nature of projects (undertaken by the organisation) and the project management approach/systems adopted to manage those projects. [13 marks]
4. Digital technologies have the potential to address challenges presented by the complexity of mega projects.
- a) Your team is working as the main contractor for a multi-billion pound megaproject. The project involves the creation of a 25km long, 7m diameter tunnel running along the path of the river Thames in London. Based on the characteristics of the project, evaluate applications of three different digital technologies that could be employed for improving construction of the project, discuss their applications, expected benefits as well as challenges. [15 marks]
- b) Digital technology applications can stimulate a new business model innovation for the construction sector. Identify two key paradigm shifts in business model innovation, and discuss their relevance for construction. [6 marks]
- c) 'Fragmentation' is often seen as one of the major factors that hinder the performance improvement in the construction industry. Discuss how each type of fragmentation below, has hindered the performance of the construction industry, and identify possible strategies to address them.
- i) Vertical fragmentation
 - ii) Horizontal fragmentation
 - iii) Longitudinal fragmentation
- [12 marks]

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SECTION C

(Answer **ONE** question from this section)

5. Modern Methods of Construction (MMC), especially offsite construction, are being increasingly promoted in the UK.
- a) Compare and contrast the seven levels/categories of MMC. [14 marks]
 - b) Describe the main critical success factors (CSFs) for offsite construction. [10 marks]
 - c) Speed is often stated as one of the main benefits of offsite construction. Explain why it can be faster, and provide some examples of projects when speed of installation would be of benefit, and examples of when it would not. [9 marks]
6. a) Compare and contrast the different levels of offsite technologies providing examples where possible from sectors such as residential, commercial, retail, infrastructure and engineering construction. [16 marks]
- b) Offsite is 'better' than traditional. Provide a balanced argument for and against this statement. [10 marks]
 - c) Compare and contrast the typical design, manufacture and construction schedules (timeline) for a traditional build and a volumetric whole building approach. [7 marks]

R Soetanto
F Edum-Fotwe
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M Wang