Universiti Tun Hussein Onn Malaysia

# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

## FINAL EXAMINATION
## SEMESTER I
## SESSION 2021/2022

| | | |
|---|---|---|
| COURSE NAME | : | SUSTAINABLE CONSTRUCTION MANAGEMENT |
| COURSE CODE | : | MFA 10103 |
| PROGRAMME | : | MFA |
| EXAMINATION DATE | : | JANUARY / FEBRUARY 2022 |
| DURATION | : | 3 HOURS |
| INSTRUCTION | : | 1. ANSWER **ALL QUESTIONS**<br>2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **OPEN BOOK** |

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

**Q1** **(a)** The major goal of an organization is to satisfy a customer's need, so does for a project. Beyond this similarity, the characteristics of a project help differentiate projects from other functions carried out in the daily operations of an organization. List and explain **FIVE (5)** characteristics of a project that clarify this statement.

(10 marks)

**(b)**

- *Poorly defined milestones*
- *Poor estimating techniques*
- *A missing CPM chart*
- *Functional managers not having a clear understanding of what has to be done*
- *Poor programming procedures and techniques*
- *Changes constantly being made deep in the project's life cycle*

Above are several factors that can result in project delays and cost overruns. Recommend how these problems can be overcome.

(15 marks)

**Q2** **(a)** Your company has been awarded a project to construct 10 stories of an educational building at a proposed site as shown in **Figure Q2(a)**. The project has been submitted to be assessed by Green Building Index by the owner. As a project manager, you are required to adhere to the requirements in the criteria of Sustainable Site Planning and Management. Based on item SM5, SM7, and SM 11 in GBI assessment criteria for non-residential new construction (NRNC), plan your proposed site layout. Justify your selection.

(15 marks)

**(b)** Another prominent method for evaluating green buildings for commercial and residential building construction projects in Malaysia is by using the Green Real Estate (GreenRE) method. By referring to the latest GreenRE Tools for Non-Residential Building,

(i) Explain **TWO (2)** criteria that relate to the on-site sustainable construction management practice.

(6 marks)

(ii) Propose **ONE (1)** sustainable practice that can be implemented on the construction site for each criterion in **Q2(b)(i)**.

(4 marks)

**Q3** **(a)** Commissioning (Cx) is a systematic process of ensuring that all building facility systems perform interactively in accordance with the design documentation and intent. The commissioning process is recommended to

be applied as early as the pre-design phase. Assess **TWO (2)** impacts of the commissioning process in the pre-design phase.

(7 marks)

**(b)** An office building at UTHM has experienced a decline in the energy efficiency of mechanical and electrical systems even though it is still newly built and commissioned. As a result, the amount of energy used by the building has been increased.

(i) Based on the above statement, suggest the suitable commissioning type that can be applied to reduce the issues related to the efficiency of the mechanical and electrical (M&E) system.

(4 marks)

(ii) Discuss how to implement the selected method in **Q3(b)(i)**.

(6 marks)

**(c)** Koskela (2002) defined lean construction as "a way to design production systems to minimize waste of materials, time, and effort to generate the maximum possible amount of value''. Based on this statement, compare the benefits of implementing the following lean construction principles during the construction process.

(i) Flow

(4 marks)

(ii) Pull

(4 marks)

**Q4** **(a)** According to Construction Industry Development Board of Malaysia (CIDB), iIdustrialized Building System (IBS) is a construction technique in which components are manufactured in a controlled environment (on or off-site), transported, positioned, and assembled into a structure with minimal additional site works. Discuss **TWO (2)** issues that need to be carefully considered in using IBS for the construction project.

(7 marks)

**(b)** Building Information Modelling (BIM) is one of the emerging technologies that present the integrated information in a 3-Dimensional model and a related database of construction that is interconnected. Justify how the implementation of BIM can make the construction industry more efficient, effective, flexible, and innovative.

(10 marks)

**(c)** A new additional building which consists of the classroom has been planned to be built for a school in Kluang District. As an officer in charge of this project, you are required to conduct a life cycle cost analysis (LCCA) for the project. Classify and detail out the types of costs to be considered in the LCCA of the project.

(8 marks)

**-END OF QUESTIONS-**

**FINAL EXAMINATION**

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| SEMESTER/SESSION | : SEMESTER I 20212022 | PROGRAMME CODE | : MFA |
| COURSE NAME | : SUSTAINABLE CONSTRUCTION MANAGEMENT | COURSE CODE | : MFA10103 |

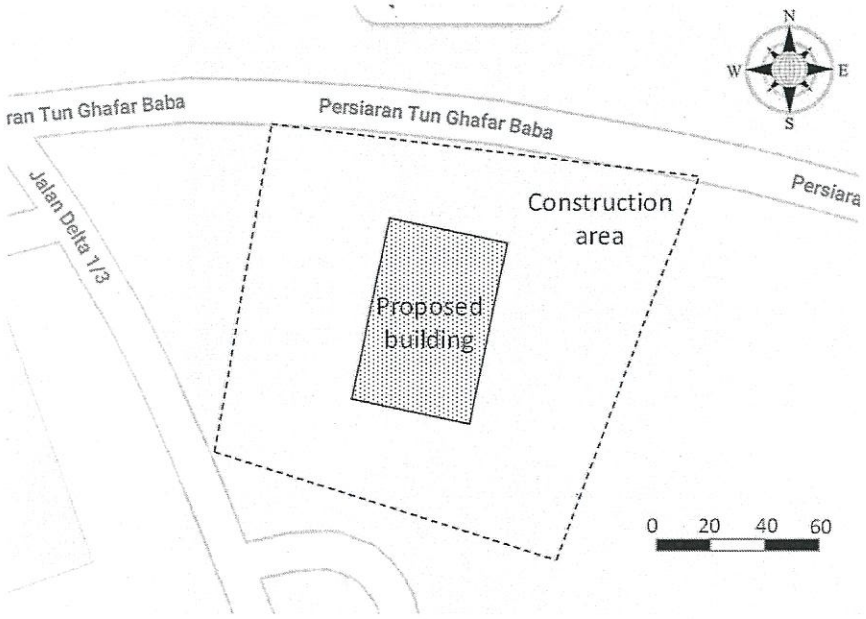


**Figure Q2(a):** Proposed site location

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## FINAL EXAMINATION
## SEMESTER I
## SESSION 2021/2022

| | | |
|---|---|---|
| COURSE NAME | : | ADVANCED STRUCTURE ANALYSIS |
| COURSE CODE | : | MFA 10203 |
| PROGRAMME CODE | : | MFA |
| EXAMINATION DATE | : | JANUARY / FEBRUARY 2022 |
| DURATION | : | 3 HOURS |
| INSTRUCTION | : | 1. ANSWER **ALL QUESTIONS**<br>2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **CLOSE BOOK** |

THIS QUESTION PAPER CONSISTS OF **SIX ( 6 )** PAGES

**Q1** **(a)** Yield line is an ultimate load theory for slab design. The assumptions of this theory was based on collapse mechanisms and plastic properties of under reinforced slabs. Define assumptions considered in yield line theory.

(2 marks)

**(b)** Sketch the yield line pattern for the slabs shown in **Figure Q1 (a)**.

(3 marks)

**(c)** **Figure Q1(b)** shows a rectangular slab with an opening. This slab has been designed for three storey multipurpose building. In the design, three sides AB, BD and CD are fixed supports. However, 15 years after construction, side CD suddenly collapse due to overloading and causes it is failed in moment. The slab also carrying a 900 mm height brickwall and point load, P is 15kN. Given the following data:

| | | |
|---|---|---|
| Brick thickness | = | 115 mm |
| Slab thickness | = | 200 mm |
| Finishes | = | 1.5 kN/m$^2$ |
| Density of concrete | = | 24 kN/m$^3$ |
| Imposed load | = | 5.0 kN/m$^2$ |
| Density of brick | = | 26.6kN/m$^3$ |

(i) Define and draw the yield line of the slab results after the failure of side CD.

(4 marks)

(ii) Identify the collapsed moment for each direction after the slab CD failure.

(16 marks)

**Q2** **(a)** Consider a column AB of length,L hinged at both its ends A and B carries an axial buckling load at A. Derive the formula for buckling load when the both ends of the column are hinged.

(8 marks)

**(b)** **Figure Q2** shows a pin-pin aluminium column with length of 8m and cross-section of column, respectively.

(i) Evaluate the critical load of a pin-pin column if E is 200GPa.

(12 marks)

(ii) If the allowable compressive stress in the aluminum column is 240 MPa. Find that the column is more likely to buckle or yield.

(3 marks)

(iii) If the safety factor = 2, define the allowable buckling load.

(2 marks)

**Q3** (a) Describe and draw **THREE (3)** common types of elements used in finite element method.

(6 marks)

(b) **Figure Q3(a)** shows a cantilever beam attached with 5kg and 10kg steel buckets at point B and C, respectively. Meanwhile, there is moment, M1 with 20kNm acting at point C. Determine the internal forces and the deflections of the cantilever beam using flexibility method (assume gravity acceleration is 10 $m/s^2$ and EI is constant).

(19 marks)

**Q4** (a) Identify and sketch the possible collapse mechanisms for the structure shown in **Figure Q4(a).**

(5 marks)

(b) **Figure Q4(b)** shows a frame has been subjected to a concentrated load at point B, C and F. All columns have the same plastic moment 3Mp except for members GH. Meanwhile, all beams have similar plastic moment, Mp. Determine the critical load P (answers in Mp and L).

(20 marks)

**-END OF QUESTIONS-**

**FINAL EXAMINATION**

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COURSE NAME : ADVANCED STRUCTURE ANALYSIS COURSE CODE : MFA10203

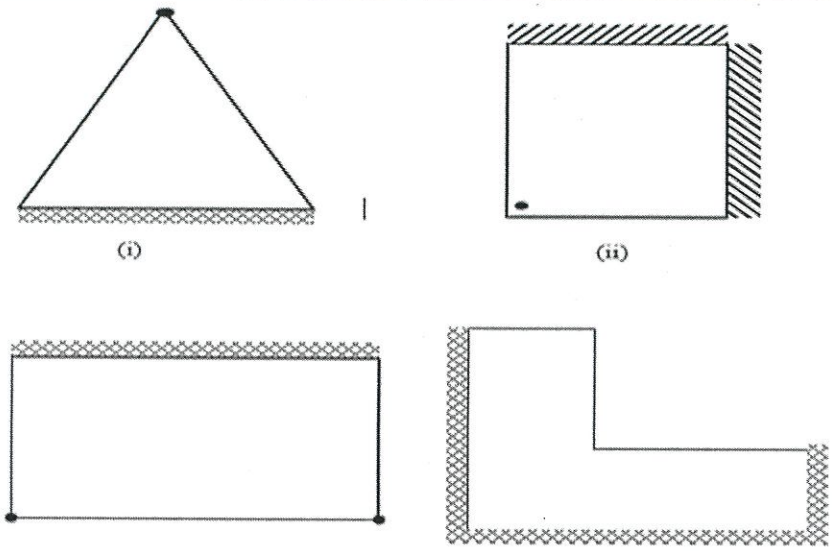


**Figure Q1 (a):** Slabs pattern

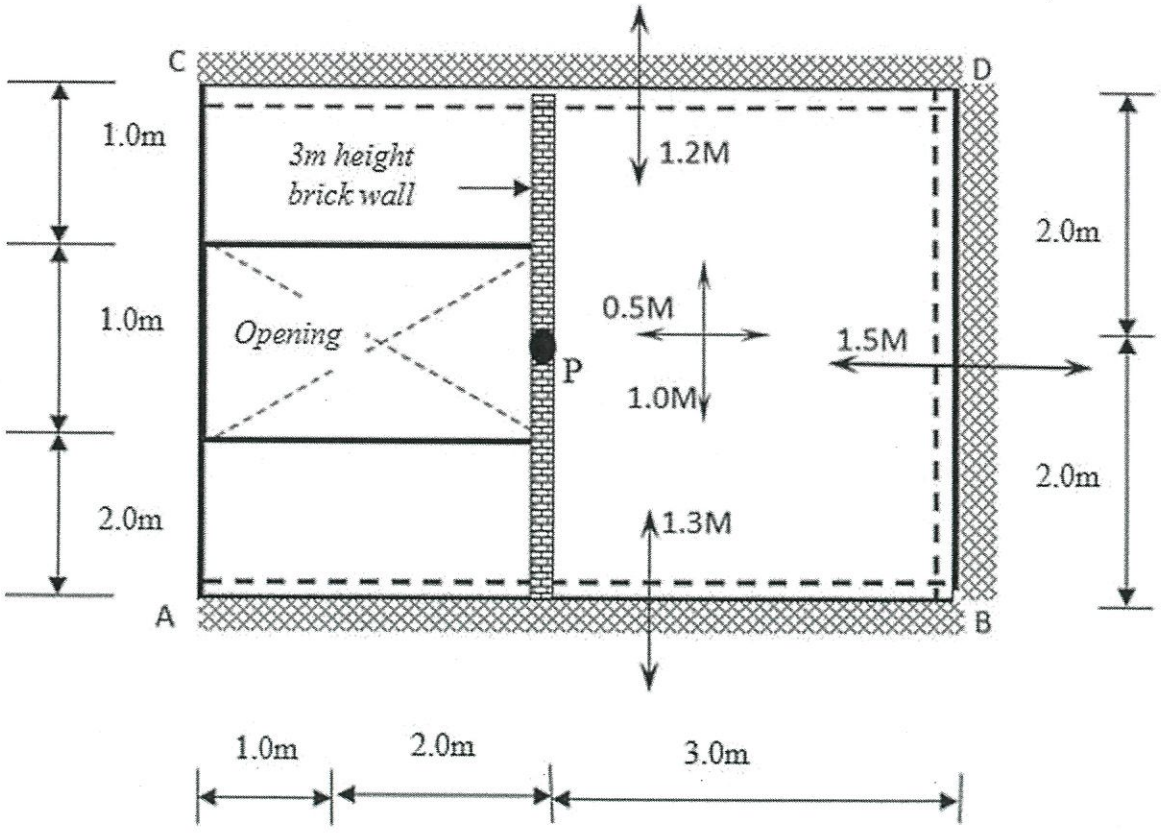


**Figure Q1 (b):** Rectangular slab

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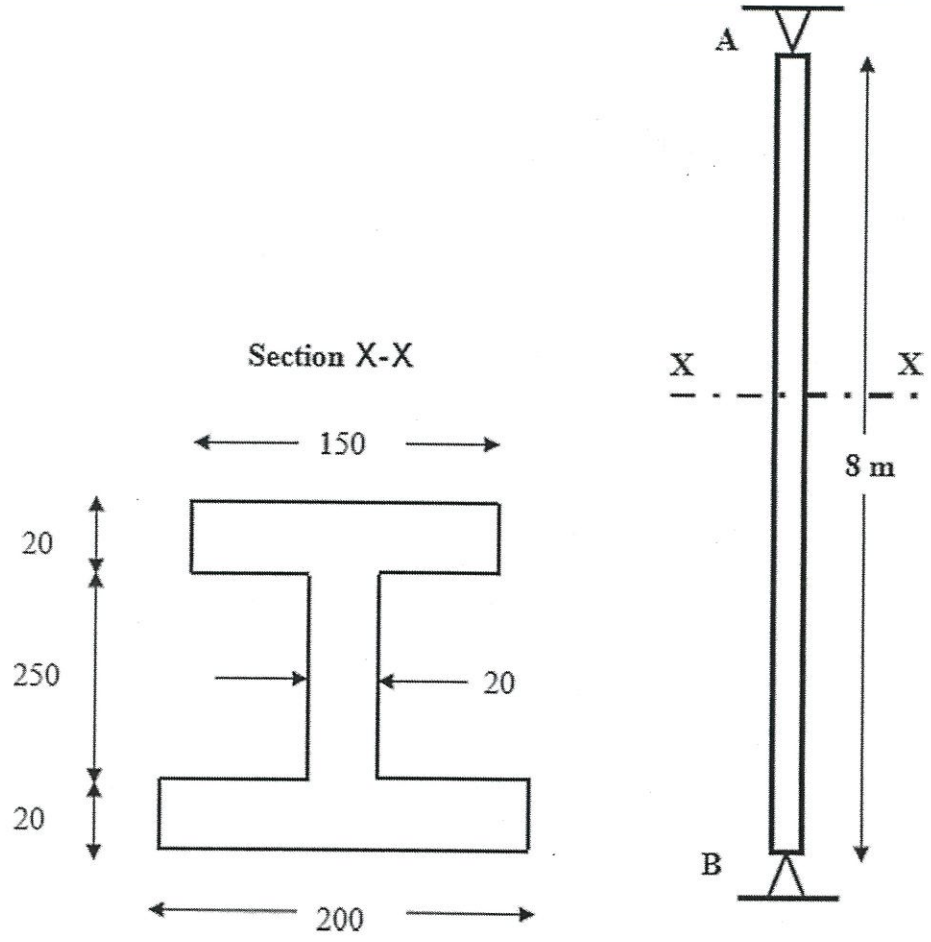


**Figure Q2:** Pin-pin aluminium column

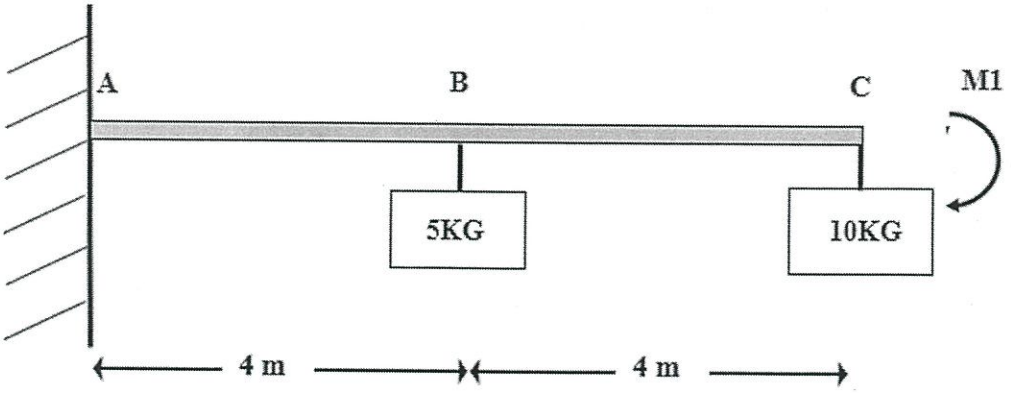


**Figure Q3(a):** Cantilever beam

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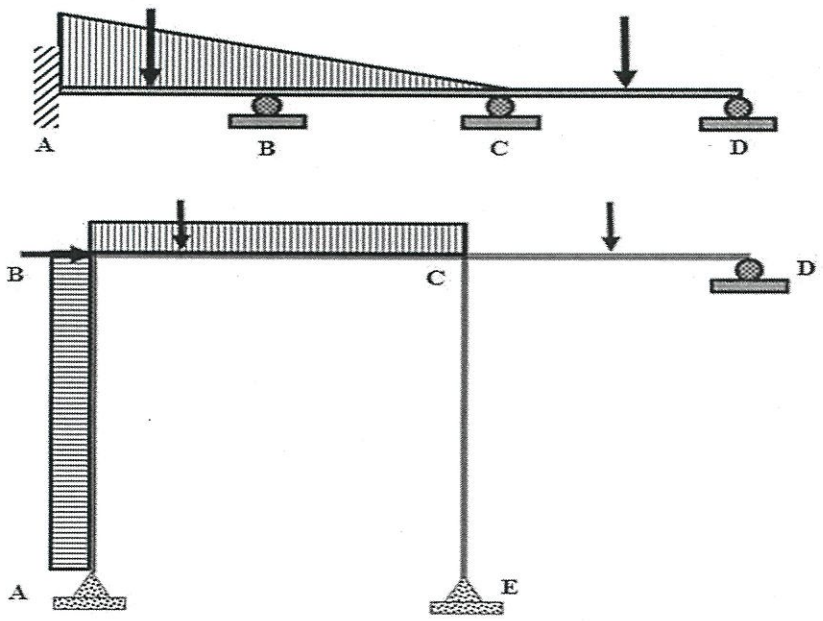


**Figure Q4(a):** Structure

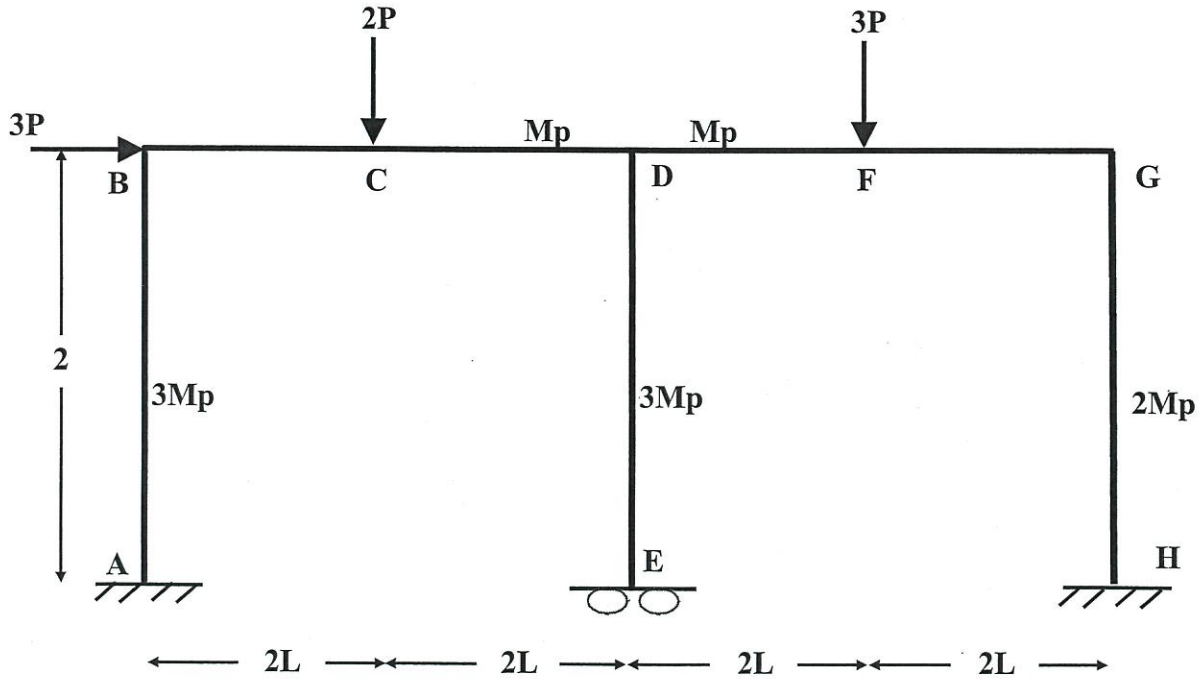


**Figure Q4(b):** Frame