



THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING – 4th YEAR DEGREE
SECOND SEMESTER FINAL EXAMINATIONS - 2023

CE 421 – INTEGRATED BUILDING DESIGN

DATE: MONDAY, 23rd OCTOBER 2023 – 12:50 P.M

VENUE: C004/5

TIME ALLOWED: 3 HOURS

INFORMATION FOR CANDIDATES

1. **Submit your answer sheets for Part A and Part B separately with the Part I of the question papers stitched with the answer scripts of each part.** You have 10 minutes to read the paper before the examination starts. You must **not** begin writing during this time.
2. **Answer for 5 marks from Part 1 of Part A and 5 marks from Part 1 of Part B. In Part II, there are 4 questions in Part A and 4 questions in Part B. Answer 3 Questions from Part II of Part A and 3 questions from Part II of Part B.**
3. Use only ink. Do not use pencils for writing except for drawings and sketches.
4. Only Calculator is allowed in the examination room. MOBILE PHONE is not allowed (**Switch your Mobile Phones OFF**). Notes and textbooks are not allowed.
5. Start each question on a new page and show all your calculations in the answer book provided. No other material will be accepted.
6. **Write your NAME and clearly on the front page. Do it now.**
7. **Marking Scheme:** Five (5) marks for Part I of Part A and 5 marks for Part I of Part B. Maximum $3 \times 15 = 45$ marks for Part II of Part A and 45 marks for Part II of Part B.

PART A

Part I (Answer 5 questions for 1 mark each)

QUESTION 1 [5 MARKS] SLO 2 Undertake conceptual foundation and structural design

Circle around the accurate answer you choose (0.5 mark) and write concise and precise explanation(s) supporting the choice (0.5 mark).

(a) Foundation in integrated building design is designed for safety and checked for serviceability only.

- (i) True
- ii. False

(b) Conceptual design includes the design of interactions, experiences, processes, and strategies.

- i True
- ii. False

(c) Conceptual structural design, the design is generally governed by multiple objective criteria that are in conflict.

- i True
- ii. False

(d) To provide a framework for selecting the most appropriate type of foundation, a useful mnemonic is ‘the 5 S’s’: S – Soil; S – Structure; S – Site; other two S’s’ are:

- i strength and serviceability, . ii. safety and sustainability.

(e) Zero net energy, even positive net –energy building can be designed through Integrated building design.

- i. True
- ii. False

(f) Solar energy received by the earth is reflected back to the space with the same wavelength,

- i True
- ii. False

Part II of Part A (Answer any 3 questions : 3X15 = 45 Marks)**QUESTION 2 [15 marks] SLO2**

What is conceptual design? What is the difference between safety and serviceability? Can a structure be safe but fail due to serviceability? Write a short note on the factors to be considered in conceptual foundation and conceptual structural design. $1+2+2+5+5 = 15$ Marks

QUESTION 3 [15 marks] SLO 3

Which design method you prefer between the integrated building design and conventional method of design and why? What are the different services which are considered in integrated building design over conventional building design? Critically discuss on the involvement of experts from different disciplines of science, engineering and technology in integrated building design. $2+3+5+5 = 15$ Marks

QUESTION 4 [15 marks] SLO 4

Are CAD and BIM same? Distinguishing between BIM and CAD. Propose your idea of applying Building Information Modelling (BIM) to integrated design concepts. List different services those are needed to be considered in integrated building design. $2+3+5+5 = 15$ Marks

QUESTION 5 [15 marks] SLO 5

What is meant by Energy efficiency and by the term energy performance of the buildings? Are the measurable? How they are interdependent? How does the mode of solar energy utilization affect integrated building design. In your opinion, what is the role of climate change on the integrated building design? $2+1+2+5+5 = 15$ Marks