

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY
THE DEPARTMENT OF ARCHITECTURE AND CONSTRUCTION MANAGEMENT
SECOND SEMESTER EXAMINATION
FOURTH YEAR BACHELOR IN CONSTRUCTION MANAGEMENT
CM420 – PROJECT DYNAMICS II

Room: ST1
Date: Tuesday 24th October, 2023
DURATION: 3 Hours
Time: 12:50pm – 16:00pm

Instructions to Candidates

1. You have 10 minutes to read the paper. Do not begin writing during this time.
2. Fill in the Attendance Slip with your name and student I.D. number now
3. There are four (4) pages to this exam paper including exam attachment.
4. **There are two (2) Parts** to this exam and you are to **answer all questions**.
5. ALL ANSWERS MUST BE WRITTEN IN THE ANSWER BOOK (S) PROVIDED
6. Each question must be answered starting on a New Page.
7. Notes and Textbooks are not allowed in the Test Room.
Only materials allowed and to be brought in by students are;
 - Calculators
 - Pens, biros and pencils

WRITE YOUR NAME AND IDENTIFICATION NUMBER CLEARLY ON THE FRONT PAGE. DO IT NOW!

TOTAL MARKS = 100 MARKS

PART A Short Answer Questions [40 marks]

Question 1 [10marks]

Explain the differences between Exterior Wall Claddings and Facades in buildings.

Question 2 [10marks]

Explain what is a Suspended Ceiling and why is it used in building construction?

Question 3 [10marks]

Explain what are Mechanical Services in buildings?

Question 4 [10marks]

Explain what is Project Financing and Cash Flow Forecasting in a building construction?

PART B Calculations [60 marks]

Question 1 [10marks]

A single storey classroom of dimensions 25.00m x 8.00m x 4.00m high (floor to suspended ceiling) and the working plane of the classroom is 0.80m above the floor level. The classroom has a white ceiling and light coloured walls with reflection factors of 70% (ceiling) and 50% (walls) respectively. Based on these reflectance factors, the utilisation factor is 0.6 and the maintenance factor under normal conditions is 0.75. As per electrical specification, the classroom is required to use 40W fluorescent light fittings with a rated output of 3200 lumen. If the illumination level is 300 lux, determine the number of fittings required.

Question 2 [10marks]

A single storey science laboratory building is measured 15.0m long and 10.0m wide, with the height from ceiling to floor at 4.2m. The working plane is measured at 1.0m from the floor, and as per specification, requires an illumination level of 400 lux on the working plane. It is required that 40W fluorescent light fitting with a rated output of 4300 lumen is to be installed. Based on the reflectance factor ratios of 70% (ceiling) and 50% (walls), the maintenance factor is rated at 0.8 and the utilisation factor at 0.5 under normal conditions. Calculate the number of light fittings required for this science laboratory building.

Question 3 [10marks]

A designer has drawn a plan for a metal fabrication workshop building measuring 20.0m long and 8.0m wide, with the height from ceiling to floor at 4.0m. The working plane for the benches is measured at 1.0m from the floor. The designer assumed the workshop requires twenty 40W fluorescent light fittings and as per specification, requires an illumination level of 400 lux on the working plane. The 40W fluorescent light fitting with a rated output of 4300 lumen is to be installed and based on the reflectance factor ratios for ceiling at 70% and walls at 50%, the maintenance factor is rated at 0.8 and the utilisation factor at 0.6 under normal conditions. Calculate to justify and make recommendations if twenty 40W fluorescent light fittings required for this workshop building are correct.

Question 4

[10marks]

A double single storey classroom of dimensions 25.00m x 8.00m x 3.20m high per room (floor to suspended ceiling) is designed by an Architectural Firm. The working plane of the classroom is 0.80m above the floor level (floor to desk height). The designers assumed that this double single storey classroom will require twenty 40W fluorescent light fittings to each classroom, in total forty fluorescent light fittings. The double single storey classroom has reflection factors of 70% (ceiling) and 50% (walls) respectively, and the utilisation factor is 0.6 and maintenance factor under normal conditions is 0.75. As per the electrical specification, the classroom is required to use 40W fluorescent light fittings with a rated output of 3200 lumen for good lighting. If the illumination level required for a classroom is 300 lux, calculate to justify and make recommendations if the twenty 40W light fittings required per room is correct.

Question 5 and Question 6, use the Tables attached (Table 11.2, 11.3 and 11.4) to justify your calculations and recommendations.

Question 5

[10marks]

An Architectural Firm is designing a proposed 20 storey luxury flat building for a client to be built in Lae City. The building has a net floor area above ground level to be 10,000m² and the floor height of each floor at 3.30m. The designers assume unified starting time and a population density of one person per 10m² of net floor area and an allowance of 15% of the population will use the lift in a peak period. Justify and make recommendations by calculating;

- a) The flow rate
- b) The travel and speed
- c) The number and capacity of Lifts
- d) The quality of service

Question 6

[10marks]

A proposed architectural design for a Lae City redevelopment plan for a 15 storey office complex building is in progress, with a proposed net floor area above ground level to be 8,000m² and the floor height of each floor at 3.30m. The designers of the building assumed unified starting time and a population density of one person per 10m² of net floor area, allowing 13% of the population uses the lift in a peak period, and suggested that the building can accommodate 5 cars. Calculate and make recommendations if the need for 5 cars as suggested by the designers is correct or otherwise by determining the following;

- a) The flow rate
- b) The travel and speed
- c) The number and capacity of Lifts
- d) The quality of service

End of Exam

Table 11.2

Interval (s)	Quality of service
25-35	Excellent
35-45	Acceptable for offices
60	Acceptable for hotels
90	Acceptable for flats

Lift travel: The travel of a lift is the number of floors above ground multiplied by the floor height.

Lift speeds: The recommended lift speeds for various building heights are given in Table 11.3.

Table 11.3

Speed (m/s)	Lift travel in metres			
	Municipal flats	Luxury flats	Offices	Bed lifts
0.25-0.375	—	—	—	5
0.50	30	15	10	10
0.75	45	20	15	—
1.00	55	25	20	20
1.50	—	—	30	45
2.50	—	—	45	100
3.50	—	—	60	—
5.00	—	—	125	—

Table 11.4

Passenger lift performance (based on 3.3 m floor-to-floor heights) and lifts serving all of 15 floors				Interval (s)		Handling capacity (persons)	
Number of cars	Speed (m/s)	12 passengers	16 passengers	20 passengers	24 passengers	24 passengers	24 passengers
4	2.50	29 103	32 112	37 127	41 137	41	137
4	3.50		31 116	36 132	40 142	40	142
5	3.50		25 146	29 165	32 178	32	178
6	3.50			24 198	27 213	27	213