OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
HARMATTAN SEMESTER EXAMINATIONS 2021/2022 SESSION
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

B.Sc. Building **January 2023**

BLD 403: DESIGN OF REINFORCED CONCRETE STRUCTURES II

Instruction: Answer 3 Questions **Time allowed:** 2½ hours

Question 1

a. Differentiate between the following.
   i. An axially loaded column and an eccentrically loaded column.
   ii. A column subjected to uni-axial bending and a column subjected to bi-axial bending.

b. Using the following design parameters- f_{cu} = 30 N/mm^2, concrete cover = 30 mm, 20 mm diameter bars, 10 mm diameter links and f_y = 460 N/mm^2, design the longitudinal and shear reinforcements for a 350 x 350 mm column subjected to a dead load of 800 kN, imposed load of 400 kN, a bending moment of 60 kNm about the x-axis and a bending moment of 30 kNm about the y-axis.

Question 2

Design a square pad foundation for a 300 x 300 mm column subjected to a dead load of 700 kN, an imposed load of 300 kN and a bending moment of 50 kNm about the x-axis and a bending moment of 25 kNm about the y-axis on a soil with a bearing capacity of 160 kN/m^2. Assume a selfweight of 150 kN and a depth of 500 mm for the foundation slab, 20 mm diameter bars with f_y = 460 N/mm^2, a concrete cover of 50 mm and f_{cu} = 35 N/mm^2.

Question 3

A cantilever retaining wall (overall depth of 6.0 m, 500 mm thick stem wall, 4000 x 600 mm base slab, 1.0 m long toe and 2.5 m long heel) is to retain a soil with a unit weight of 25 kN/m^3, internal angle of friction of 30°, allowable bearing pressure of 180 kN/m^2 and a coefficient of friction of 0.4. Use concrete with a unit weight of 24 kN/m^3 and f_{cu} = 35 N/mm^2, concrete cover = 50 mm, 20 mm diameter bars with f_y = 460 N/mm^2.

a. Assuming that the surface of the fill is horizontal and there is no passive earth pressure, check the suitability of the wall against sliding and overturning failures.

b. Hence, design the bending reinforcements for the stem wall and the toe and heel slabs.

Question 4

a. Describe the methods of prestressing concrete, the relevance of eccentrically applied prestress force and advantages of prestressed over reinforced concrete structures.

b. A simply supported concrete beam, with a 400 x 800 mm section, is subjected to a uniformly distributed load of 150 kN/m over a span of 12 metres and a prestress force at an eccentricity of 120 mm below its centroidal axis. Calculate the minimum prestress force required to support the load and determine the maximum and minimum stresses at the top and bottom of the beam at the midspan and supports.

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE

HARMATTAN SEMESTER EXAMINATIONS 2018/2019 SESSION

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

B.Sc. Building **July 2019**

BLD 403: DESIGN OF REINFORCED CONCRETE STRUCTURES II

Instruction: Answer 3 Questions **Time allowed:** 2½ hours

Question 1

a. Differentiate between prestressed concrete and reinforced concrete.

b. Describe the methods of prestressing concrete and discuss the relevance of eccentrically applied prestress force in prestressed concrete.

c. A simply supported concrete beam (300 x 600 mm) is subjected to a uniformly distributed load of 100 kN/m over a span of 12 metres and a prestress force at an eccentricity of 100 mm below its centroidal axis. Calculate the minimum prestress force required to support the load and determine the maximum and minimum stresses at the top and bottom of the beam at the midspan and at the supports.

Question 2

a. Discuss the situations that could lead to the use of combined base foundation.

b. Design a suitable square pad foundation for a 350 x 350 mm column subjected to a dead load of 700 kN, an imposed load of 300 kN and a bending moment of 60 kNm on a soil with a bearing capacity of 160 kN/m^2. Assume a selfweight of 120 kN and a depth of 500 mm for the foundation slab, 16 mm diameter bars with f_y = 460 N/mm^2, f_{cu} = 35 N/mm^2 and a concrete cover of 50 mm.

Question 3

a. Discuss the relevance of shear reinforcement in columns and situations that could lead to biaxial bending of columns.

b. Design the longitudinal and shear reinforcements for a 400 x 400 mm column subjected to a dead load of 750 kN, imposed load of 400 kN, a bending moment of 50 kNm about the x-axis and a bending moment of 30 kNm about the y-axis. Assume f_{cu} = 30 N/mm^2, concrete cover = 30 mm, 16 mm diameter longitudinal bars and 10 mm diameter links with f_y = 460 N/mm^2.

Enhancement coefficient (β) for biaxial bending

N / bhf_{cu}	0	0.1	0.2	0.3	0.4	0.5	≥ 0.6
β	1.00	0.88	0.77	0.65	0.53	0.42	0.30

Question 4

a. Explain how the surcharge load on a retaining wall could be accommodated.

b. Design the cantilever retaining wall in Figure 1 to retain a soil with a unit weight of 20 kN/m^3, internal angle of friction of 30°, bearing capacity of 150 kN/m^2 and a coefficient of friction of 0.4. Assume f_{cu} = 35 N/mm^2, concrete cover = 50 mm, f_y = 460 N/mm^2, 20 mm main bars and unit weight of concrete = 24 kN/m^3.

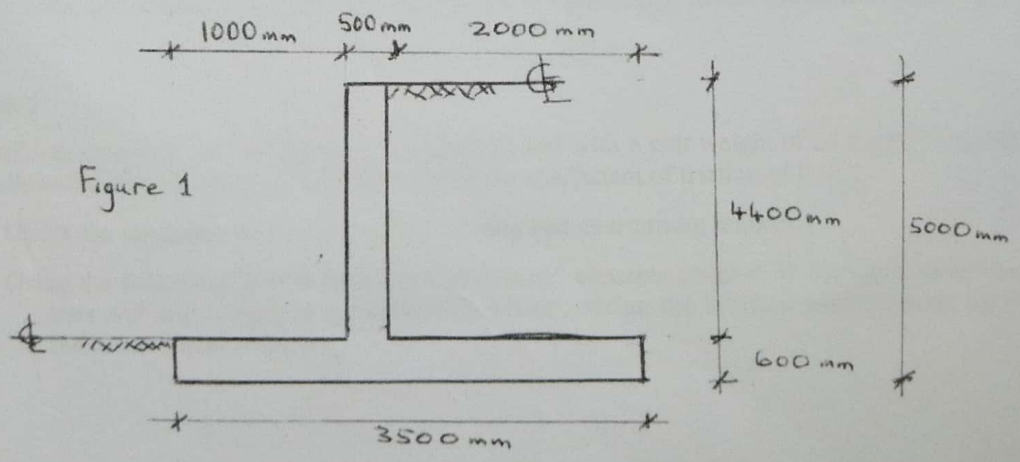

Figure 1

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HARMATTAN SEMESTER EXAMINATIONS 2017/2018 SESSION

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

B.Sc. Building **August 2018**

BLD 403: DESIGN OF REINFORCED CONCRETE STRUCTURES II

Instruction: Answer 3 Questions. Question 1 is compulsory. **Time allowed: 2½ hours**

Question 1

a. Discuss the following:
   i. The situations that could lead to the use of combined base foundation.
   ii. The relevance of bending schedule in concrete construction.

b. Differentiate between the following:
   i. Gravity retaining wall and flexible retaining wall.
   ii. Cantilever retaining wall and counterfort retaining wall.

c. Explain the following:
   i. How the hydrostatic pressure behind a retaining wall could be minimised.
   ii. How the surcharge load on a retaining wall could be accommodated.

d. Explain the need for curtailment of reinforcement in concrete structures. A cantilever retaining wall has a stem wall 5 metres high. Determine the minimum height at which the bending reinforcement should be curtailed for 50% curtailment.

Question 2

A column, 400 x 400 mm, subjected to a dead load of 600 kN, an imposed load of 250 kN and a bending moment of 50 kNm is to be supported with a square pad foundation on a soil with a bearing capacity of 160 kN/m^2. Assume a selfweight of 100 kN and a depth of 500 mm for the foundation slab, 16 mm diameter bars with f_y = 460 N/mm^2, f_{cu} = 35 N/mm^2 and a concrete cover of 50 mm.

i. Determine the size of the foundation slab.

ii. Design the bending reinforcement for the foundation slab.

iii. Check the adequacy of the foundation against punching shear, maximum shear and face shear.

Question 3

The cantilever retaining wall in Figure 1 is to retain a soil with a unit weight of 24 kN/m^3, internal angle of friction of 30°, allowable bearing pressure of 165 kN/m^2 and a coefficient of friction of 0.4.

i. Check the adequacy of the wall against sliding and overturning failures.

ii. Using the following design data: f_{cu} = 35 N/mm^2, concrete cover = 50 mm, f_y = 460 N/mm^2, 20 mm main bars and unit weight of concrete = 24 kN/m^3, design the bending reinforcement for the stem wall and the toe and heel slabs.

Question 4

a. Explain the following:
   i. The need for shear reinforcement in columns.
   ii. The situations that could lead to biaxial bending of columns.

b. Design the longitudinal and shear reinforcements for a 350 x 400 mm column subjected to a dead load of 750 kN, imposed load of 450 kN, a bending moment of 50 kNm about the x-axis and a bending moment of 20 kNm about the y-axis. Design data are f_{cu} = 30 N/mm^2, concrete cover = 30 mm, 16 mm diameter longitudinal bars and 10 mm diameter links with f_y = 460 N/mm^2.

Enhancement coefficient (β) for biaxial bending

N / bhf_{cu}	0	0.1	0.2	0.3	0.4	0.5	≥ 0.6
β	1.00	0.88	0.77	0.65	0.53	0.42	0.30

Question 5

a. Differentiate between prestressed concrete and reinforced concrete.

b. Describe the methods of prestressing concrete and discuss the relevance of eccentrically applied prestress force in prestressed concrete.

c. A simply supported concrete beam (400 x 800 mm) is subjected to a uniformly distributed load of 100 kN/m over a span of 12 metres and a prestress force at an eccentricity of 120 mm below its centroidal axis. Calculate the minimum prestress force required to support the load and determine the maximum and minimum stresses at the top and bottom of the beam at the midspan and at the supports.

BLD 403 2017/2018

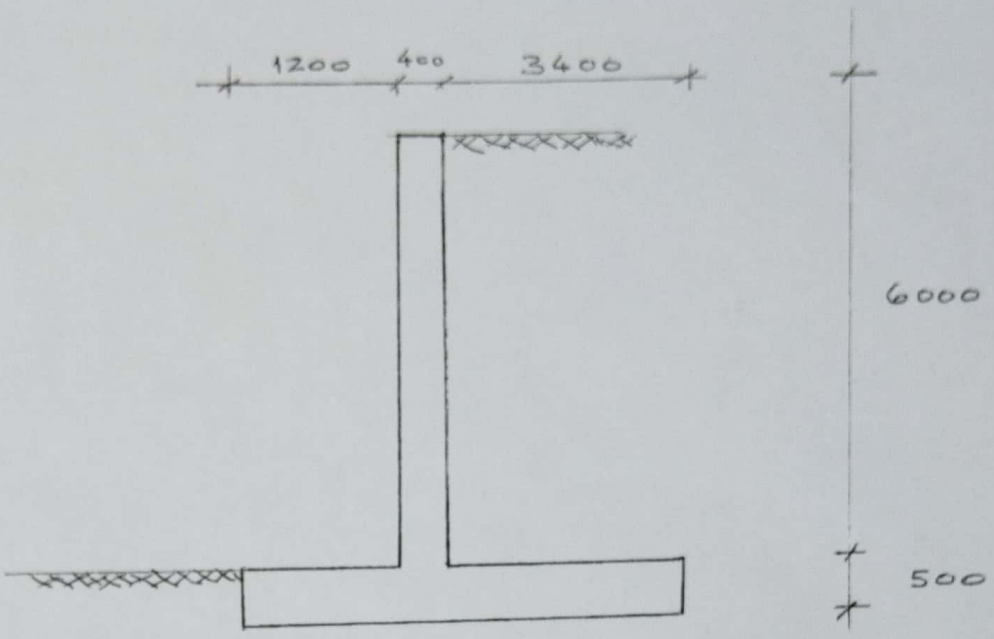

Figure 1

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HARMATTAN SEMESTER EXAMINATIONS 2021/2022 SESSION
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

B.Sc. Architecture

January 2023

BLD 421: ANALYSIS AND DESIGN OF TIMBER AND STEEL STRUCTURES

Instruction: Answer 3 Questions (At least one Question from each Section)

Time allowed: 2½ hours

Section A (Timber Design)

Question 1

Check the adequacy of a simply supported 150 x 200 mm SC7 timber beam to support a dead load of 5 kN/m and an imposed load of 3 kN/m over a span 5.0 metres. The beam ends are held in position with both edges firmly held in line. Loading is long-term and the timber is free of wane. Wall plate is 150 mm wide and 75 mm thick.

Question 2

a) Differentiate between a concentrically loaded and an eccentrically loaded compression member.

b) Check the adequacy of a 250 mm x 250 mm SC8 timber column to support an axial load of 80 kN and a bending moment of 15 kNm. The column is restrained at both ends in position and direction and has a height of 4.0 metres.

Section B (Steel Design)

Question 3

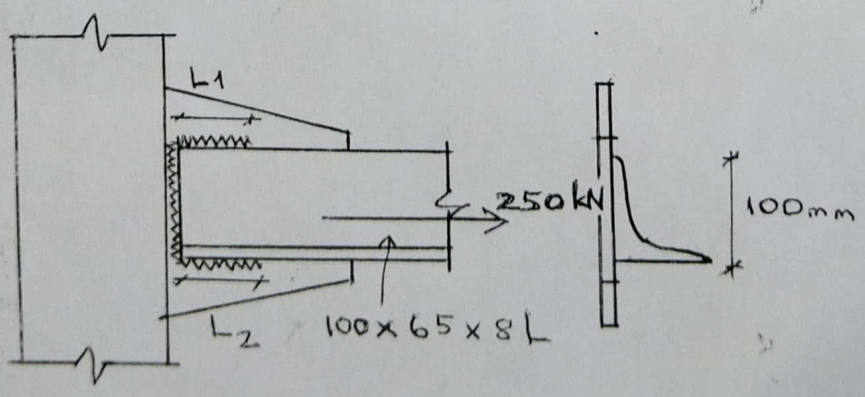
A simply supported 406 x 178 x 67 UB, carrying a brittle finish, is subjected to a dead load of 20 kN/m and a live load of 12 kN/m over a span of 10 metres. Check the adequacy of the beam against shear, bending and deflection failures. Assume Grade 43 steel, Young's Modulus, $E = 2.0 \times 10^5$ N/mm^2 and acceleration due to gravity, $g = 10$ m/s^2.

Question 4

Check the adequacy of a 203 x 203 x 86 kg/m concentrically loaded UC, with an effective length of 4 m, to support a dead load of 800 kN and an imposed load of 400 kN. Assume Grade 43 steel.

Question 5

Using Grade 43 steel, 6 mm fillet weld and Class 35 electrode, determine the lengths (L1 and L2) required for the connection between the gusset plate and the angle shown below.



OBAFEMI AWOLOWO UNIVERSITY, ILLE-IFE, NIGERIA

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING
Harmattan Semester Examination 2021/2022 Session

B.Sc. Building
BLD 407: Building Services and Equipment III

Instructions: Answer question **one** and any other **two** questions **Time Allowed:** $2\frac{1}{2}$hours
Illustrate your answers with mathematical equations and diagrams where necessary.

Question One

(a) Using symbol only, present the following electrical fittings, apparatus and equipment on lighting installation drawing:
(i) 5A/10A 1 gang 1 way switch (ii) 5A/10A 3gang 1way switch (iii) 5A/10A 2 gang 2 way switch (iv) Ceiling mounted chandelier fitting (v) 13A Switch Socket Outlet (SSO) (vi) 13A Twin Switch Socket Outlet (SSO) (vii) Heat detector (viii) Smoke detector (ix) Fire alarm panel (x) 30A Cooker Control Unit (xi) Ceiling Fan Regulator (xii) Distribution Board (xiii) Extractor Fan (xiv) Fuse or Circuit Breaker (xv) Two-40W Fluorescent. **(15 marks)**
(b) Enumerate the logical steps to be taken in the design of lighting installations for a typical building using lumen method. **(5 marks)**
(c) Design and produce lighting installation layout for the attached drawings. **(40 marks)**

Assumptions

Floor height = 3000 mm; Working plane= 850 mm; Spacing to mounting height ratio is 3:2

Lighting Design Data

Lamp type - 40W fluorescent tube; Efficiency- 37.5 lm/watt; Luminous flux (Ø) - 3200 lm; Utilization factor - 0.55; Maintenance factor - 0.8

Illuminance Data

Restaurant - 300lux; Office - 300lux; Conference room – 300 lux; Lecture room - 300lux; Car park - 200 lux; Toilet - 100 lux, Gallery - 300 lux; Security post - 200 lux; Lobby - 300 lux; Drawing studio - 500lux

Question Two

Explain the relevance of the following systems in buildings:
(a) Public Address System (PAS) **(15 marks)**
(b) PABX system ($7\frac{1}{2}$ **marks**)
(c) PMBX system ($7\frac{1}{2}$ **marks**)

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HARMATTAN SEMESTER EXAMINATIONS 2021/2022 SESSION

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

B.Sc. Building **January, 2023**

BLD 401: STRUCTURAL ANALYSIS

Instruction: Answer 3 Questions. Question 1 is compulsory. **Time allowed: 2½** hours

Question 1

a. Using a yield strength of 320 N/mm^2, determine the shape factor for the beam section in Figure 1.

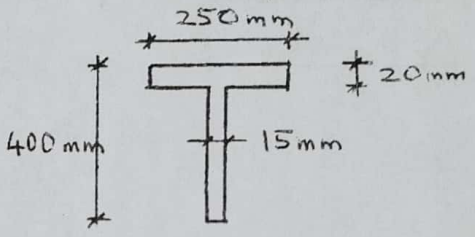

Figure 1

b. Using Kani's method of structural analysis and 5 iteration cycles,
   i. determine the support and span moments for the beam in Figure 2; and
   ii. draw the bending moment and shear force diagrams.

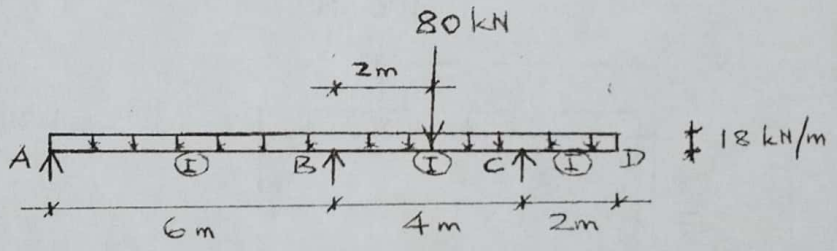

Figure 2

(50 marks)

Question 2

The truss in Figure 3 is made of 60 mm thick and 100 mm wide rectangular members. Using a Young's Modulus, E = 2.4 x 10 ^{3} N/mm ^{2}, determine the following.

a. The stiffness matrices of the members.
b. The stiffness matrix of the truss.
c. The displacements at the joints of the truss
d. The strains, stresses and axial forces in the members.

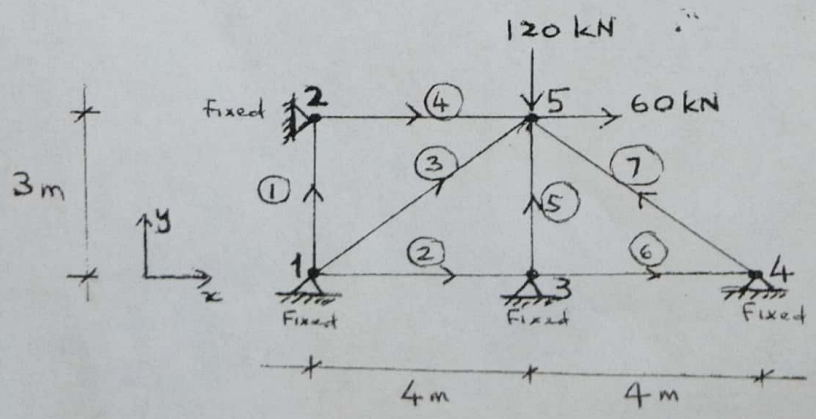

Figure 3

(25 marks)

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HARMATTAN SEMESTER EXAMINATIONS 2017/2018 SESSION

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

B.Sc. Building **August, 2018**

BLD 401: STRUCTURAL ANALYSIS

Instruction: Answer 3 Questions **Time allowed: 2½ hours**

Question 1

The T-Beam in Figure 1 is made from a material with a yield strength of 250 N/mm^2, determine

a. The plastic moment of the beam at a depth of plastification of 75%.
b. The yield moment, plastic moment and shape factor of the beam.

Question 2

Using Kani's method of structural analysis, determine the end and midspan moments for the continuous beam in Figure 2. Use 5 iteration cycles.

Question 3

Using a yield strength of 275 N/mm^2, determine the yield moment, plastic moment, shape factor and collapse load of the beam in Figure 3.

Question 4

Using Kani's method of structural analysis, determine the end moments and midspan moments for the frame in Figure 4. Use 6 iteration cycles.

Question 5

The truss in Figure 5 is made of 60 mm thick and 150 wide rectangular members. Using a Young's Modulus (E) of 2.5 x 10^4 N/mm^2, determine the following:

a. The stiffness matrices of the members.
b. The stiffness matrix of the truss.
c. The displacement at the joints of the truss
d. The strains and stresses in the members.
e. The axial forces in the members.

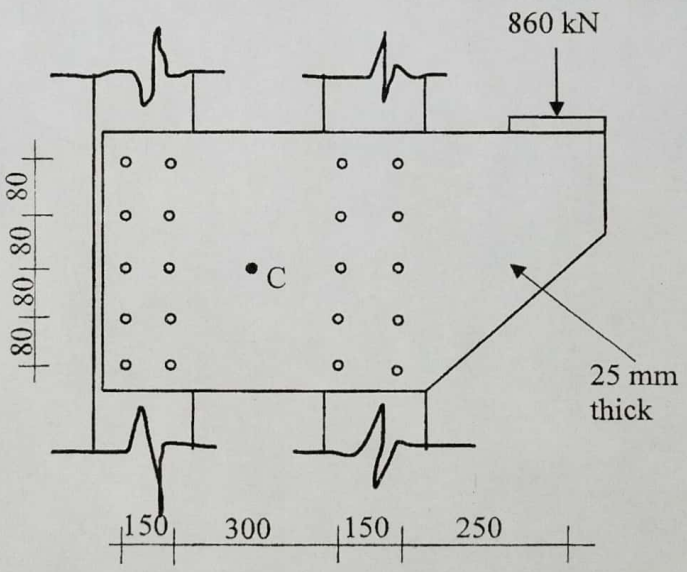
OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF BUILDING

2018/2019 HARMATTAN SEMESTER EXAMINATION

BLD 421: Analysis and Design of Timber and Steel Structures I
B.Sc. Architecture **Time allowed**: 3 hrs
Instruction: Answer Questions **1** and any other **two** questions (**3 questions in all**)

Question One

(a) Enumerate any **5** field of application of steel structures.
(b) Mention **5** merits of steel structures and the principal drawback of steel members.
(c) List and discuss any **3** properties of steel.
(d) What is the strength of a steel joint?
(e) Determine the size of the close-tolerance bolts required to affect the connection between the bracket and the stanchion shown below. All dimensions are in mm.
(f) Alternatively, design the joint using power driven field rivets made from materials with $f_y = 350\ N/mm^2$, $f_s = 140\ N/mm^2$ and $f_t = 305\ N/mm^2$



Question Two

(a) Enumerate the design procedure for a flexural steel member.
(b) Design a joist to carry a uniformly distributed load of 12 kN/m^2 over a span of 3 m. Use Grade 50 steel and the elastic modulus, $E = 2.1 \times 10^5\ N/mm^2$.

Question Three

(a) Compare and contrast the use of steel and timber as structural members.
(b) List and discuss the **3** main types of bolt.
(c) Using the black bolt, design the connection between
(i) the stanchion and the cleat angles (ii) the cleat and the brackets.

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT

DEPARTMENT OF BUILDING

Harmattan Semester Examination
Session: 2018/2019
B.Sc. Building
BLD 405: Principles of Construction Management **TIME ALLOWED: 3 Hrs**
INSTRUCTION: Sections A and B should be answered in Separate booklets.

SECTION A

INSTRUCTION: Answer any THREE questions.

QUESTION 1

(a). What is the importance of structure in an organisation?
(b). What is "span of control"?
(c). Organisations are always structured for effective management. Discuss how organisations can be structured. Use charts to illustrate your answer using construction site personnel.

QUESTION 2

(a). Discuss the administrative theory of organisation propagated by Fayol.
(b). Discuss the Neoclassical theory of organisation.
(c). Differentiate between the Classical and the Neo-classical theories of organisation

QUESTION 3

(a). Distinguish between a "manager" and a "leader".
(b). The Contingency theory of leadership states that "effective leadership depends on the degree of fit between a leader's qualities and leadership style and that demanded by a specific situation". Explain this statement in relation to leadership.
(c). The Trait Theory is one of the theories to explain leadership. Identify and explain these trait's variables. Why is it difficult in using the Trait theory to explain effective leadership?

QUESTION 4

(a). Describe the Alderfer's ERG Model of motivation theory.
Explain the interrelations among the three needs.
(b). Explain the differences between the Maslow's model and Alderfer's ERG model of motivation.
(c). McClelland believes a person's motivation and effectiveness in certain job functions are influenced by three needs.
(i) Identify and explain these three needs
(ii). Describe the characteristics of those being described in these three needs

QUESTION 5

(a). Describe and explain the problem of communication in the construction industry.
(b). Explain the classification of communication within project organisation.
(c). Many organisational problems are caused by communication failure. Why do communication fail?