INTERNATIONAL UNIVERSITY OF EAST AFRICA

'Learning to Succeed'

FACULTY OF ENGINEERING

END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: BACHELOR OF CIVIL ENGINEERING

YEAR/SEM: YEAR 4/SEMESTER 2

COURSE CODE: BCE4201

NAME: BUILDING SERVICES

DATE: 2025-04-17

TIME: 9:00AM-12:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A This section consists of four (4) questions in total each carrying 25 marks, you are expected to attempt any two (2) questions for full score from this section.

Question 1:

a) Describe the concept of â??Plumbing Inspectionâ?? in a drainage system. **(03 Marks)**

b) Outline the importance of Plumbing inspections in a drainage system. **(05 Marks)**

c) â??Manholesâ?? and â??Inspection chambersâ?? are key structures in drainage network.

i) Describe the functions of these structures. **(04 Marks)**

ii) Outline the major operational requirements of these structures. **(04 Marks)**

d) For the floor plan in Figure 3, sketch a feasible drainage network for this structure assuming a 1In3 site lope towards the garage; illustrate key drainage structures on your plan. **(09 Marks)**

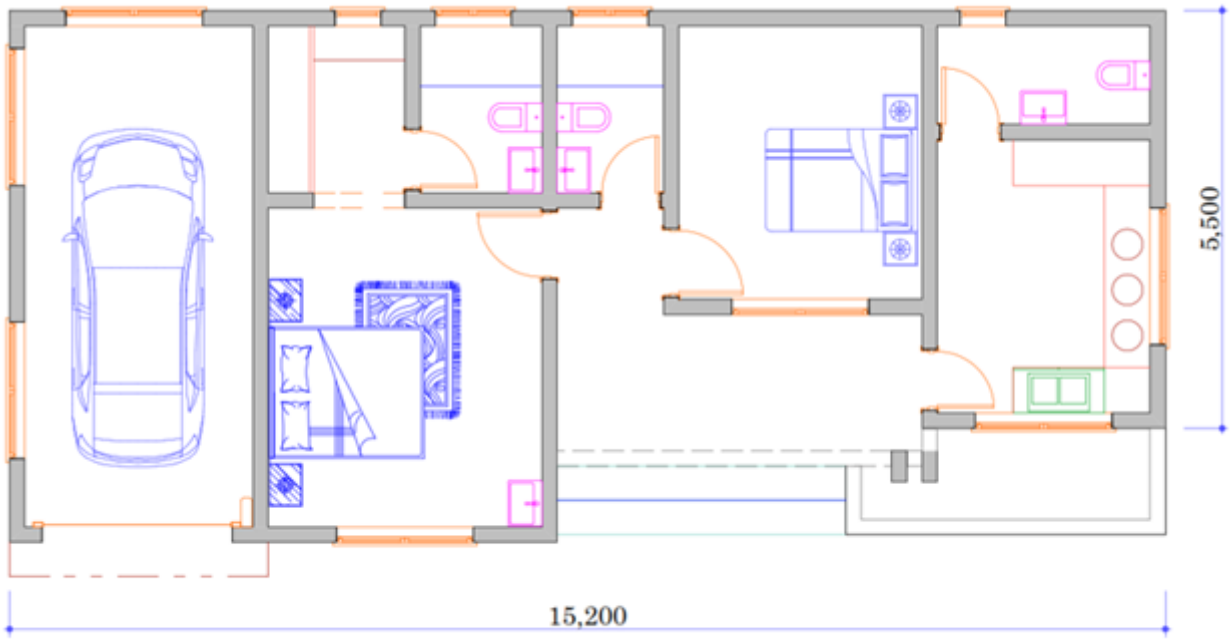

Figure 3 (Proposed Ground Floor Plan 2)

Question 2:

a) Using examples, explain the term â??Building servicesâ?? in relation to the building where you are sitting this examination from. **(03 Marks)**

b) Using illustrations where necessary, describe the difference between the following systems in water supply:

i) â??Direct water supply systemâ?? and â??Indirect water supply system.â?? **(04 Marks)**

ii) â??Cold water supply systemâ?? and â??Hot water supply system.â?? **(04 Marks)**

c) Briefly describe how â??Water Pressureâ??, â??Pipe Materialâ??, and â??Water flow rateâ?? each influence water supply system design. **(06 Marks)**

d) Using illustrations, explain the following methods of water distribution. Which option, in your opinion, suits water distribution to a boarding seed secondary school located downstream at the foot of a hill from which the naturally existing water being supplied is sourced? (**08 Marks)**

i) Gravity System
ii) Pumping System
iii) Combined Gravity and pumping system

Question 3:

a)Â Â Â Â Â With an example, define the term â??Electrical Loadsâ?? in Electrical installations. **(02 Marks)**

b)Â Â Â Â Â Outline any 4 building services or its components that can be categorized under Electrical system. **(04 Marks)**

c)Â Â Â Â Â Explain the difference between the following terms **(06 Marks)**

i)Â Â Â Â Â Â â??Voltageâ?? and â??Currentâ??
ii)Â Â Â Â â??Direct Currentâ?? and â??Alternating Currentâ??
iii)Â Â â??Primary Distribution Systemâ?? and â??Secondary Distribution Systemâ??

d)Â Â Â Â Â Electrical distribution system could be classified under four categories; â??1-Type of Current, 2-Type of Construction, 3-Number of Wires or 4-Scheme of Connection.â?? Outline any two subdivisions under each of the four classification categories. **(08 Marks).**

e)Â Â Â Â Â Explain the term â??Conductorâ?? in electrical system and outline any four (4) metals that are good conductors of electricity. **(05 Marks).**

Question 4:

a) Outline any five drainage design considerations one should pay attention to in a single-storeyed residential structure. **(05 Marks)**
b) Water supply is normally better planned with an appropriate drainage system. Explain any five (5) defects that may likely occur and affect a domestic water supply system. **(10 Marks)**
c)Â Describe the main drainage structures/components that should mandatorily be considered in a drainage network to ensure proper functioning of the system, in each case, explain the function it specifically plays. **(10 Marks)**

Section B This section consists of four (4) questions in total each carrying 25 marks, attempt any two (2) questions for full score from this section..

Question 1:

A functional building service combination is an integral chain of indoor and outdoor services; quite often, most internal services are complemented by the external services.

i) Explain any six (6) external services that directly support and compliment internal building services. **(12 Marks)**
ii) Recently, lots of tech-based building services continue to gain popularity other than the traditional growing building services; describe any five (5) notable recent (post-COVID 19) technology-based building services evolutions in recent infrastructure designs and developments. **(05 Marks)**
iii) Looking at a local context, industrial context of your choice, for instance, Ugandaâ??s industry, discuss the common challenges in ensuring operational building services in infrastructure designs and operations **(08 Marks)**

Question 2:

a)ÂÂÂÂÂ What constitutes â??fire protectionâ?? as a major building service in building design? **(02 Marks)**

b)ÂÂÂÂÂ Describe following fire safety aspects, in each case, explain how it is ensured in a building

i)ÂÂÂÂÂÂ Passive Fire Prevention **(05 Marks)**

ii)ÂÂÂÂ Active Fire Prevention **(05 Marks)**

c)ÂÂÂÂÂ Describe any four (4) Fire Suppression approaches in a building. **(08 Marks)**

d)ÂÂÂÂÂ In design of reinforced concrete structures, fire resistance is stipulated inform of the cover to the reinforcement, briefly explain how concrete and steel complement each other to ensure better performance against fire in these structures. **(03 Marks)**

Question 3:

a)Â Â Water distribution/supply to a multistoreyed system could be done using a (i) â??Direct Pumping systemâ??, (ii) â??Hydro-pneumatic systemsâ?? or (iii) â??Overhead Tank Distribution system.â?? With the aid of elaborate illustrations, describe these systems recommended for water supply in such category of structures. **(09 Marks)**

b)ÂÂÂÂÂ Waste water treatment is in most cases considered as one of the most feasible sustainable approaches for waste water management. The process could be subdivided into â??Primaryâ?? and â??Secondaryâ?? treatment. Describe the waste water treatment process under these two sub-divisions of waste water treatment. **(10 Marks)**

c)ÂÂÂÂÂ As a candidate of this course unit, â??Building Servicesâ??, outline;

i)ÂÂÂÂÂÂ The relevance of this course to you as a civil engineer **(03 Marks)**

ii)ÂÂÂÂ What key takeaway points/lessons did you pick up from this course? **(03 Marks)**

Question 4:

a) Briefly differentiate between â??Refrigeration and Ventilationâ?? in HVAC design. **(04 Marks)**

b) Refrigeration conventionally uses four essential elements to achieve cooling; these include: Compressor, Condenser, Metering Device and Evaporator. Describe the refrigerating cycle in relation to the operation in each of the four essential elements. **(12 Marks)**

c) Outline the purpose of ducts in Centralized chilled water systems **(04 Marks)**

d) What considerations should be made in Duct design? You may outline them. **(05 Marks)**