



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF BUILT ENVIRONMENT

DEPARTMENT OF QUANTITY SURVEYING

BUILDING SERVICES 2

AAR 3203

Main Examination Paper

April 2015

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: None

Examiner's Name: Muvungani Rangarirai

INSTRUCTIONS

1. Answer any **four** questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
TOTAL	100

Question One

- a) Explain with the aid of sketches, ways in which the noise and vibrations produced by mechanical and electrical services of a building can be controlled or minimised. [12]
- b) Discuss problems associated with the use of refuse chutes which have to be well taken care of during their design [13]

Question Two

- a) Outline the basic principles that should be followed in the design of a good drainage system for a dwelling. [13]
- b) A precast concrete box channel 450mm wide is to be used to drain run-off from a pavement before it is admitted into a catch pit. If the maximum depth of water in the channel is to be 300mm when the velocity of flow is 0.8m/s, calculate the gradient of this channel. [12]

Question Three

- a) State the most appropriate mechanical ventilation system for the following, justifying your choice:
 - i. Industrial kitchen
 - ii. Internal sanitary accommodation
 - iii. Hospital operation theatre
 - iv. Entertainment theatre
 - v. City office block [15]
- b) A 4-storey commercial building is to be mechanically ventilated. Air-handling plant is to be sited on the roof. Each floor has dimensions 20mx10mx3m and is to have 6 air changes per hour. Of the air supplied, 10% is allowed to exfiltrate naturally and the remainder is extracted mechanically through the roof level. The supply and extract air ducts run vertically within a concrete service shaft and the limiting air velocity is 10m/s. Calculate the size of the service shaft given that service ducts are to be used and there is to be at least 150mm between the duct and any other surface. [10]

Question Four

- a) Differentiate room acoustics from building acoustics [5]
- b) Explain the main objectives of studying room acoustics [10]
- c) Discuss the use of lightning protection systems in buildings [10]

Question Five

- a) Describe the procedure you would follow to carry out a soil percolation test prior to designing a septic system [10]
- b) Design a septic system for a household of 20 that has a 5 acre plot in Kensington Bulawayo, and explain how it will work to your client [15]