# NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

**FACULTY OF BUILT ENVIRONMENT**

**DEPARTMENT OF ARCHITECTURE**

**BUILDING SERVICES 2**

**AAR 3203**

**Main Examination Paper**

**May 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]