NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE
2013-14 ACADEMIC YEAR
PART II–1st SEMESTER EXAMINATION – DECEMBER 2013
AAR 2105 – Structural Design I

Instructions   _Duration: 3 Hours_

Answer all questions.   **_Total Marks 100_**

QUESTION 1

(a) In structural design describe the types of loads to be considered.

(b) Describe each type of load.

(c) Describe the limit states to be considered in structural design.   _[25]_

QUESTION 2

A 250mm thick simply supported reinforced concrete slab spans 5.0m. Design a
Suitable slab using Grade 25 concrete and grade 460 reinforcement to support the
following characterisitic loads:

Finishes   0.5kN/m^2

Concrete   24kN/m

Imposed   4.0kN/m^2   _[25]_

QUESTION 3

A reinforced concrete beam ıs 300mm wide and spans 6.0m. It carries a characterisitic
dead load of 20kn/m and a characterisitic live load of 10kn/m. Calculate the overall
depth and area of reinforcement required.
Assume grade 30 concrete and Grade 460 reinforcement.   _[25]_

QUESTION 4

A flat roof spanning 4.25m is to be designed using timber joists at 600mm centres.

The loads to be supported by the roof are

Dead load   1.0kn/m^2

Imposed load   0.3kN/m^2

Determine the size of a suitable SC3 joist checking for bending moment, shear and

deflection.

Assume the following

Modification Factors

K3- Duration of loading-1.0 ; K8 – Load sharing system- 1.1;

K7- Depth factor for

 d=225mm- 1.032 ;   d=200mm- 1.046

[25]