NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF BUILT ENVIRONMENT

DEPARTMENT ARCHITECTURE

STRUCTURAL DESIGN - I

AAR2105

Examination Paper

December 2016

This examination paper consists of 9 pages

Time Allowed: **3 hours**

Total Marks: **100**

Special Requirements: GRAPH PAPER

Examiner's Name: Eng. V.V.DESAI

INSTRUCTIONS

1. Answer all 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
TOTAL	**100**

QUESTION ONE

Timber beams spanning 4m and spaced at 3m centres as shown in figure 1.0 support a timber floor comprising joists and boards together with a plastered ceiling. The load imposed by the dead weight of the floor joists and boards is $0.25kN/m^2$ and by the ceiling is $0.20kN/m^2$. If the floor has to support an imposed load of $1.5kN/m^2$, calculate the uniformly distributed load that a single timber floor beam supports.

QUESTION TWO

A reinforced concrete beam with an effective span of 7m is 500mm deep overall by 250 mm wide. It supports a characteristic imposed load of 10kN/m and a characteristic dead load of 10kN/m. In addition to the beam self-weight. Using the simplified stress block formula given in BS8110 calculate the area of reinforcement using grade 30 concrete and grade 460 reinforcement.

QUESTION THREE

A short braced reinforced concrete column is required to support a characteristic dead load of 600kN and a characteristic imposed load of 350kN. Design a suitable circular column and reinforcement assuming grade 40 concrete and grade 460 reinforcement.

QUESTION FOUR

Timber roof purlins spanning 2.5m support a UDL of 4.0kN/m inclusive of their own weight. Using SC3 timber what size of member is required.