

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
FACULTY OF THE BUILT ENVIRONMENT

**DEPARTMENT OF ARCHITECTURE**  
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE  
2010-2011 ACADEMIC YEAR  
PART I – SUPPLEMENTARY EXAMINATIONS – AUGUST 2011  
**AAR 1206 – APPLIED STRUCTURAL STATICS AND DYNAMICS**

**Instructions**

**Duration: 3 Hours**

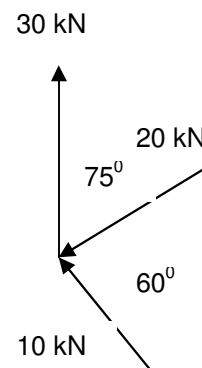
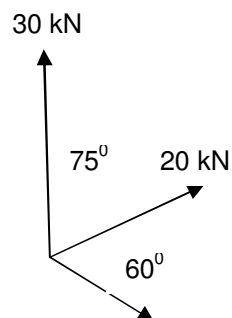
***Answer all questions.***

**QUESTION 1**

- (a) During a compression test a block of concrete 100mm square and 200mm long shortened 0.2mm when a load of 155kN was applied. Calculate the stress and strain and Modulus of Elasticity for the concrete. [8]
- (b) A hollow steel tube of 100mm external diameter and 80mm internal diameter and 3m long is subjected to a tensile load of 400kN . Calculate the stress in the material and the amount the tube stretches if Modulus of Elasticity is 200 000 N/mm<sup>2</sup>. [8]
- (c) A tie bar is 75mm wide and it has to sustain a pull of 100kN. Calculate the required thickness of the bar if the permissible stress is 150N/mm<sup>2</sup> [5]
- (d) A bar of steel, circular in section is required to transmit a pull of 40kN. If the permissible Stress is 150N/mm<sup>2</sup> calculate the diameter of the bar. [4]
- [25]

**QUESTION 2**

Figure 1.0 and 2.0 show a system of concurrent forces acting on a body. Calculate the magnitude and direction of the resultant.



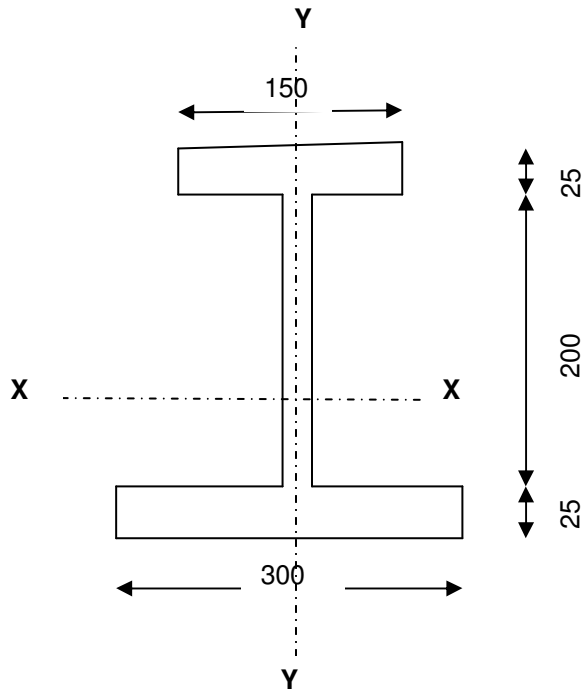
10 kN  
Figure 1.0

Figure 2.0

[25]

**QUESTION 3**

Calculate the  $I_{xx}$  and  $I_{yy}$  of the following I- section



[25]

**QUESTION 4**

Calculate the reactions and draw the bending moment and shear force diagram of the beam shown in Figure 2.0.

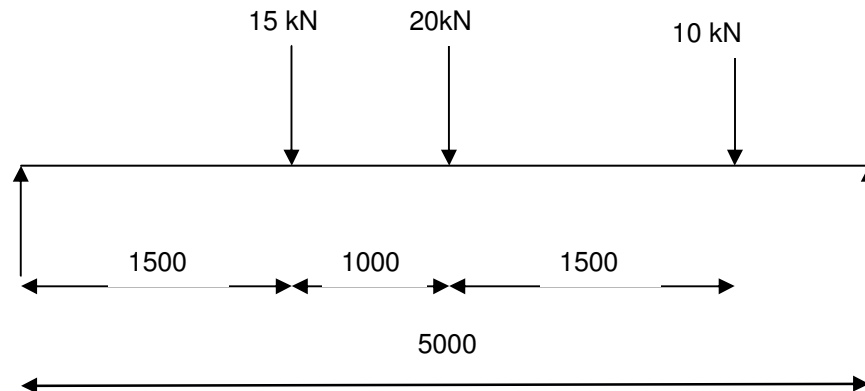


Figure 2.0

[25]