Machakos University College

(A Constituent College of Kenyatta University)
University Examinations 2013/2014

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
Examination for:

DIPLOMA IN BUILDING TECHNOLOGY
DIPLOMA IN CIVIL ENGINEERING

STRUCTURES III

Date: 20 /03/2014 Time: 8:30-11:30am

Instructions

*Answer any **FIVE** of the following **EIGHT** questions*
All questions carry equal marksz

1. Figure 1 shows the plan of a loaded column of actual length 3.7m carrying characteristic loads from three beams. It is fixed in position and direction at both ends. Select a suitable UC section for the column in grade S275 steel and check its adequacy (20 marks)

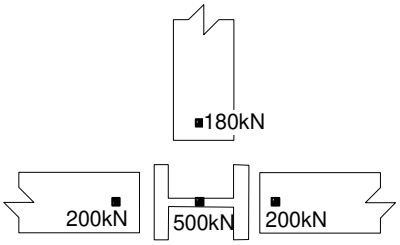

Fig. 1

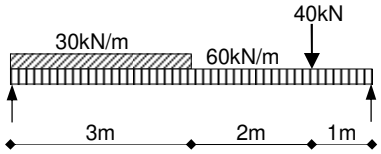

Fig. 2

2. A universal beam of effective span 6m is loaded with design loads as shown in figure 2. Select a suitable UB section in grade S275 steel and check for bending and shear. Ignore the self- weight of the UB
Also check for bearing assuming a bearing length of 200mm. (20 marks)

3. Figure 3 shows a loaded stanchion of section 305 x 305 x 118 kg/m UC. Check the adequacy of the section when cased in accordance with BS 5950 if the column has an actual length of 4.5m and is fixed at one end and pinned at the other. f_{cu} =25N/mm^2 (20 marks)

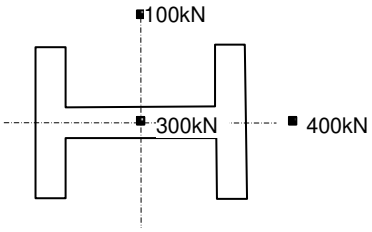

Fig. 3

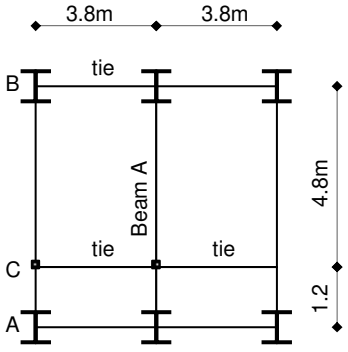

Fig. 4

4. Figure 4 shows the plan of the floor of a steel framed building. The floor consists of a 150mm thick reinforced concrete slab supported on steel beams. Each beam carries a stanchion at point C, the point load from each stanchion being 90kN. Select a suitable UB section in grade S275 steel for beam A and check its adequacy. Ignore the self-weight of the beam. Imposed load 2kN/m^2, finishes 0.8kN/m^2, E=210kN/mm^2 (20marks)

5. A suspended concrete floor slab 150mm thick is supported on simply supported universal beams of effective length 8m spaced at 3m centres. Select a suitable UB section for the internal beams in grade S275 steel and hence check for bending, shear and deflection.
Imposed load 3kN/m^2, finishes 0.8kN/m^2, E=210kN/mm^2 (20marks)

6. A universal beam is loaded as shown in figure 5. Select a suitable UB section in grade S275 steel and check for bending and shear. Ignore the self-weight of the UB. Check for bending, shear and bearing. Take bearing width as 150mm. (20 marks)

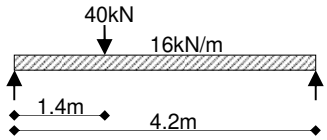

Fig. 5

7.
a) State four reasons for casing structural steel sections (4 marks)
b) Calculate the compressive resistance of a 254X254X107 UC section when cased in accordance with BS 5950. The effective length of the column about both axes is 4.0m. f_{cu} =25N/mm^2 (16 marks)

8.
a) Using a labeled sketch state six conditions that cased sections should meet in accordance with BS 5950
b) Select a suitable column in grade S275 steel to support design loads from beams A and B as shown in figure 6. The column is 4m overall length and is held in position at both ends but only restrained in direction at the bottom.

(20 marks)

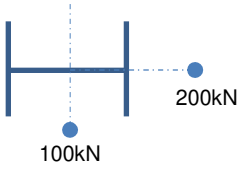

Fig. 6