TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BSC IN CIVIL ENGINEERING

ECE 2215: THEORY OF STRUCTURES II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2HOURS

DATE: 09May2016

Instructions to Candidates
You should have the following for this examination
-Answer Booklet, Drawing Instruments, Scientific calculator, examination pass and student ID
This paper consists of five questions. Attempt question ONE (Compulsory) and any other TWO questions.

QUESTION ONE

a) Using elaborate sketches explain the 3 different types of arches depending on support conditions   *(3Marks)*

b) Describe Macaulay's Method for slope and deflection.   *(3Marks)*

c) Using double integration method, show that for a cantilever with a uniformly Distributed Load the maximum deflection is given by

(9 Marks)

d) A parabolic arch has a span of 15 metres and is supported at different levels, such that crown C is 9 metres from the left support A and 6 metres from the right support B. The right support is higher than the left support by 2 metres and the crown is higher

by 1.5 metre with respect to right support. The arch is hinged at the two supports and at the crown.

Find the maximum bending moment in the arch at a section Q lying 4.5 metres from left support, when a point load W rolls over the span. (15 Marks)

QUESTION TWO

(a) A single point load of 80 kN crosses a grinder of 12 m span. Using influence lines, find the maximum positive and negative shear force and bending moment at a point 4 m from the left end. *(15 Marks)*

b).A simply supported beam of span 3 m is subjected to a central load of 10 Kn. Find the maximum slope and deflection of the beam. Take .... *(5 Marks)*........

QUESTION THREE

a) Using double integration method, show that for Cantilever with a point load at its free End the maximum deflection is given by (10 Marks)

b) A cantilever beam of 160 mm width and 240 mm depth is 1.75 m long. What load can be placed at the free end of the cantilever, if its deflection under the load is not to exceed 4.5 mm. Take E for the beam material as 180 GPa. *(10 Marks)*

QUESTION FOUR

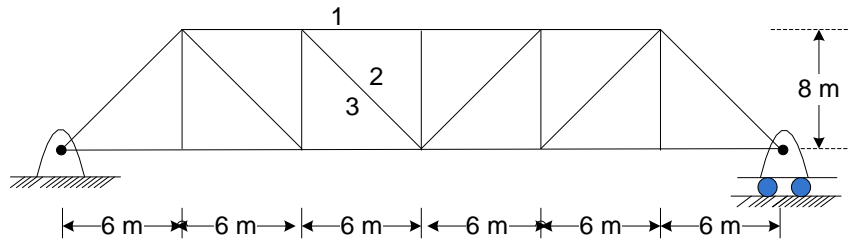A Pratt truss consists of 6 panels, each of 6 m, its height being 8 m as shown in Fig. 4

Fig. 4

It is simply supported over a span of 36 m and is loaded over the bottom chord.

(i) Draw the influence lines for force in member serialled 1, 2 and 3, in the third panel. From the left, giving principal values.

(ii) Calculate the maximum values of forces in members 1, 2 and 3 when a uniformly distributed load of intensity 60kN/m longer than the span crosses the structure.

(20 Marks

QUESTION FIVE

(b)A suspension bridge of 40 m span and 3 m wide platform is subjected to a load of 64kN/m^2. The bridge is supported by a pair of cables having central dip of 4.5m. Find the necessary cross sectional area of the cable, if the maximum permissible stress in the cable material , is not to exceed 1.2x10^{5}kN/m^2.   *(15Marks)*.

b)A cantilever beam 2 m long is subjected to a uniformly distributed load of 5kN/m over its entire length. Find the slope and deflection of the cantilever beam at its free end. Take   *(5Marks)*........