Menoufeya University
College of Engineering
Civil Engineering Dept.

Prestressed Concrete
M.Sc Jun. 2014
Time Allowed 3 hrs

OPEN BBOK , NOTES, AND HOMEWORK EXAM

Question (1) (10 %)

Define the following terms in pre-stressed concrete:

1-tendon. 2-Anchorage. 3-Pre-tensioning. 4-Post-tensioning.
5-Eccentric pre-stressing. 6- Transfer. 7-Creep in concrete.
8-Relaxation in steel. 9-Degree of pre-stress. 10-Core (kern).

Question (2) (15%)

An unsymmetrical I-section beam is used to support an imposed load of 2.5 kN/m' over a span of 9.0 m. The section details are shown in figure. At center of the span, the effective pre-stressing force of 120.0 kN is located at 5.0 cm from the soffit of the beam. Calculate the stress at the center and at one third of span section of the beam. The tendon is parabolic and the eccentricity is zero at ends.

Question (3) (15 %)

A concrete beam with a single overhang is simply supported at A and B over a span of 9.0 m and the overhang BC is 2.2 m. The beam is of rectangular section 30.0 cm wide by 80.0 cm deep and supports a uniformly distributed live load of 3.0 kN/m' over the entire length. Determine the profile of the pre-stressing cable with an effective force of 600.0 kN which can balance the dead and live loads on the beam. Sketch the profile of cable along the length of the beam.

Question (4) (15 %)

A post –tensioned pre-stressed beam of rectangular section 25 cm wide is to be designed for an imposed load of 13 kN/m' uniformly distributed on a span of 12.0 m. The stresses in the concrete must not exceed 18 kN/mm^2 in compression or 1.2 N/mm^2 in tension at any time, and the losses of pre-stress is 15%. Calculate:

a- The minimum possible depth of the beam.
b- The minimum pre-stressing force and the corresponding eccentricity for the provided section.
c- Check the results of case (b) by Magnel's graphical method.

Question (5) (15 %)

A pre-stressed road bridge of 8.0 m span consists of a concrete slab 360.0 mm thick with parallel post-tensioned cables, in each of which the force at transfer is 320.0 kN. If the bridge is required to support a uniformly distributed load of 10 kN/m^2 in addition to a concentrated moving load of 72.0 kN. The tensile