Assignment #6

(2 Questions, total = 60 marks)

Problem 1 (30 marks)

A simply supported beam of rectangular cross-section is shown in the **Figure 1**. The beam is reinforced with 4-30M longitudinal bars and 10M stirrups and has a clear cover of 40mm to the stirrups.

The maximum aggregate size is **20 mm**. **f'c= 40 MPa**, **fy= 400 MPa**.

The beam has a depth **h** = ***700 mm*** and a width **b** = ***600 mm***

The beam supports a uniform dead load of 65 kN/m (including self-weight) and a uniform live load of 35 kN/m (both are unfactored). Considering the load case 1.25D +1.5L:

(a) Construct the shear force envelope

(b) Is the shear design adequate in region 0 ? (Verify: $Vr \geq Vf$)

(c) Is the shear design adequate in region 1 ? (Verify: $Vr \geq Vf$, A_{vmin}, s_{max} and $Vr \leq Vr_{max}$)

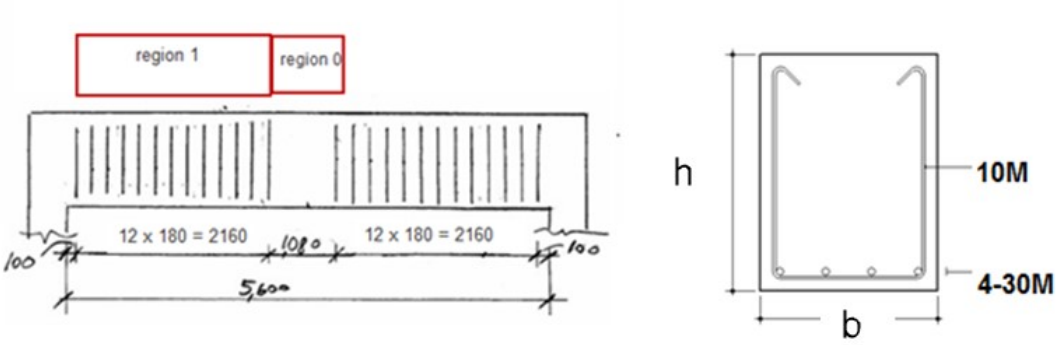

Figure 1

Problem 2 (30 marks)

Design the simply supported beam in **Figure 2** for shear under a factored distributed load is **100 kN/m**. Use **f'c = 40 MPa**, **fy = 400 MPa**, and max aggregate size = **20 mm**

Note: use three different design regions (region 0: where concrete shear strength is sufficient without stirrups, region 1: based on minimum shear reinforcement, region 2: based on max design shear force). Show the spacing of 10M Stirrups along the length of the beam.

Note: don't worry about shear envelope, draw shear diagram based on a uniform **Wf = 100 kN/m** and using c-c spacing. For region 2, design for shear force at "dv" from the centre of support.

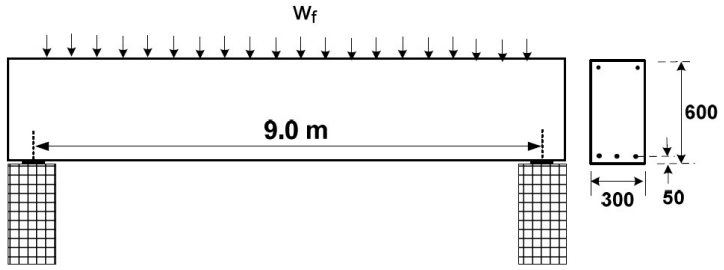

Figure 2