DEPARTMENT OF CIVIL ENGINEERING

Major- 2009

CEL 832-Design of Tall Buildings

Time 2hr. Max Marks 45

Attempt all the questions

Q1 (a) Fig. 1 shows a 20 storey shear wall building (storey height=3m) consisting of 8 planar shear walls of type A ($I = 3m^4$) and one shear wall of type B ($I= 5m^4$ about both the axes) arranged symmetrically. The building is subjected to a loading of 30kN/m, 5 m from the axis of symmetry of the building. Determine the shear force and the bending moment at the base of wall 8.

(10)

(b) (i) Write down the equation giving equivalence of flexural rigidity of wall element and equivalent analogous frame properties.

(ii) discuss how the forces from the analogous frame are converted back to forces in the shear wall.

(5)

Q2 (a) Discuss how Age Adjusted Effective Modulus Method, AEMM overcomes the shortcoming of the Effective Modulus Method, EMM in evaluation of stress transfer from concrete to steel in RC members.

(2)

(b) A R.C. column is subjected to axial load P. Using EMM show that the stress in concrete is given by

$$\sigma(t) = \frac{P}{A_c(1 + n\rho)} - \frac{\varepsilon(t)\, E_s \rho}{1 + n\rho}$$

where

$n=\frac{E_s}{E_e(t)}$ and $\rho = \frac{A_s}{A_c}$ and the other symbols have the usual meaning

(5)

(c) A column of cross section 250x250 mm with 1.5% reinforcement is subjected to an axial load of 500 kN when the age of concrete τ is 10 days . Modulus of elasticity of concrete at 10