

**Higher National Certificate in Construction and the Built Environment**  
**(Civil Engineering)**  
**Structural Analysis and Design**  
**Unit 34**

*Assignment No.4- Reinforced Concrete Design using Eurocode2 (EC2)*

**A new office block in reinforced concrete within retained masonry facades**

A financial establishment requires the renewal of a city offices block for its new headquarters. The planning authority insists on the retention of the masonry façades, shown in section A-A, on the two sides shown on the plan view. The planning authority will allow the construction of a new roof, and also curtain walling on the two new elevations, as shown. In order to line up the floors with the existing windows, and to incorporate air-conditioning, the maximum depth of structural members is to be 425mm. This allows for a raised computer floor and a clear height of 2700mm floor-to-ceiling. Further to this, the client requires a minimum column grid of 6m centres, and a desire that any columns required should not be placed in front of the windows on the retained façade elevations. The new roof is to be flat mainly support plant in new lightweight enclosures. Absolutely no new loading is to be placed on the retained masonry facades.

**Loading**

The roof and floor characteristic loadings are to be taken from **Eurocode 1 (EC1): Action on Structures** (Table designated to the Design Values  $G_k$  and  $Q_k$  for imposed loads on floors). Take the density for the reinforced concrete as  $25\text{KN/m}^3$ .

**Design Code of Practice**

The building is to be designed in accordance with **Eurocode 2 (EC2): Design of concrete structures**.

**Materials**

Concrete strength is to be taken as  $\text{C40/50 N/mm}^2$ , high yield steel with all (H500). The building is subjected to a moderate exposure condition.

**Design calculation**

- a) You are required to design one typical inner beam as a simply supported beam for;
  - i) the roof construction,
  - ii) typical floor construction,
- b) Design a typical inner column from ground to first floor.

Carry out full design procedures and calculations using reinforced concrete as the construction material and provide detailed sketches as well as reference all calculations and tables. Present your calculation in the standard design office format.