Kaferelshiekh University
Faculty of Engineering
Department of Civil Engineering

Third Year Students of Civil Engineering	Course title: Design of Reinforced Concrete structures 2	Course code : CES3015
Date : 2-6-2019	Term : Second	Total Assessment Marks : 75	Time Allowed : 4 hours
f_{cu} = 30 MPa, St.360/520, L.L.= 2 kN/m^2 Flooring cover = 2 kN/m^2 for all questions	Any missing data should be reasonably assumed. Answer as many questions as you can.	الامتحان مكون من 3 أسئلة في صفحتين

ILOS (A.4, A.5, A.6, A.9, B.4, B.5, B.11, C3, C4, C6, C7, D1, D2, D6 and D7.

Question (1) (30 marks)

A- Figure (1) shows three different statically systems of frames under gravity uniform loads; it is required to draw the B.M.D. and the corresponding main tension steel without scale without calculations showing footings.

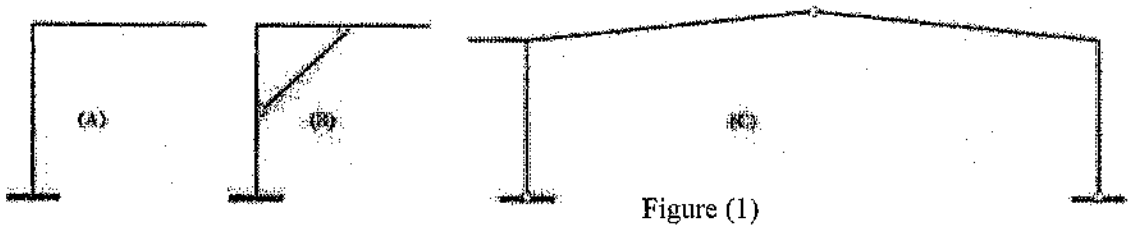

Figure (1)

B- Figure (2) shows an intermediate frame spaced at 5 m. The ultimate loads , statically system and concrete dimensions are shown in figure (2). The frame is hinged at A and B. If the slab thickness is 140 mm, it is required to carry out the following:

1) Draw BMD, NFD and SFD for the frame.
2) Design the critical sections for both flexure and shear.
3) Design the two hinged supports A and B (design + drawing).
4) Draw the reinforcement details of the frame in elevation and cross sections with suitable scale.

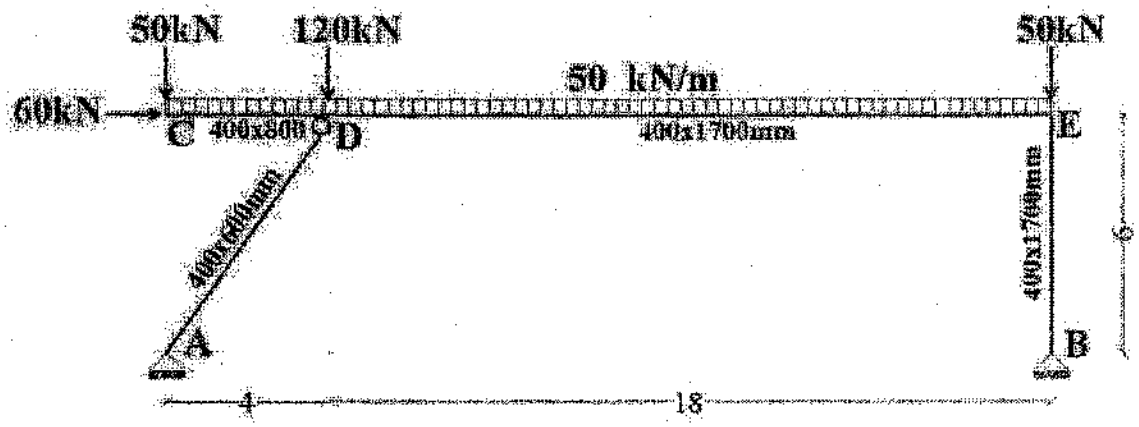

Figure (2)

Question (2) : (20 marks)

A- Answer the following points with net sketches:

1) Compare between load transfer mechanism for arch girder and arch slab.
2) State maximum span of arch slab and arch girder.
3) Illustrate design steps of the column and footing in two cases; the first is arch slab with a tie, and the second is arch slab without a tie.
4) Draw the connection between the column and the arch slab in addition to the connection between the column and the arch girder showing reinforcing bar of the connected elements.

B- An arched girder of span 24 m and its rise is 3.5 m. The arched girder spaced at 5 mm and the clear height is 6 m. If the ultimate average uniform load is 150 kN/m$^{/}$ acting on the horizontal projection and level of the roof at tie level; it is required to carry out the following:

1) Draw a half-sectional elevation to reasonable scale showing the concrete dimensions of all elements until the foundation level.

2) Design arched girder, tie, hangers, connection between girder and columns.

3) Draw a half-sectional elevation to reasonable scale showing the RFT details of all elements until the foundation level.

Question (3) : (25 marks)

Figure 3 shows plan and sectional elevations I-I and A-A of the factory area of an industrial building. The main hall is 40x42 m without allowed interior columns. Levels of the covering roofs are shown in plan and cross sections I-I and A-A. Columns are only allowed where marked X in plan. It is required to carry out the following:

1) Suggest the more suitable Main Supporting Element (MSE) and the roof slabs. Without any calculations but with reasonably assumed concrete dimensions, draw to scale 1:100 in elevations I-I and A-A and part plan showing the chosen roof slabs and MSE.

2) Calculate the total ultimate load applied on the MSE of the main hall only (30x42) if the average ultimate load of roof slab is **10 kN/m^2** not included weight of MSE.

3) Design the MSE of main hall and its elements only.

4) Draw to scale 1:100 the half sectional elevation I-I of main hall showing the reinforcement details of MSE and its components only.

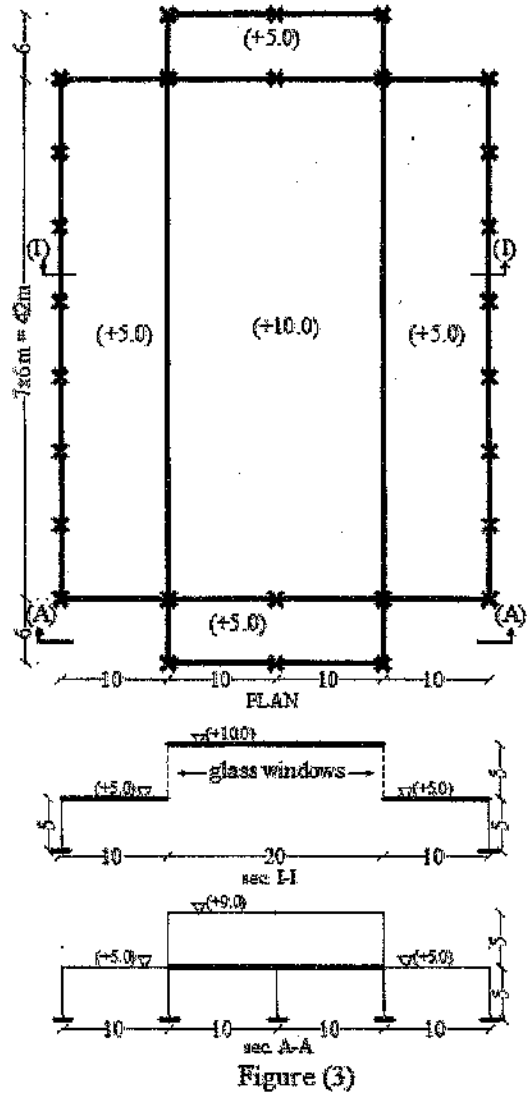

Figure (3)

With best wishes: Dr/ Sabry El-Morsy