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 : 30-12-2018	Term : First	Total Assessment Marks : **85**	Time Allowed : 4 hours
f_{cu} = 30 MPa, St.360/520, **for all questions**	Any missing data should be reasonably assumed. **Answer as many questions as you can.**		**The exam consisted of five questions on three pages**

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) 10 marks

For the structural plan shown in Fig. (1), the **paneled beams** system is required to cover the area. The slabs were loaded by **4 kN/m²** as live load plus **2 kN/m²** as covering materials. If the cross section of all beams are 300x800 mm and t_s = 100 mm, it is required to carry out the following:

1- Calculate the loads acting on all beams (interior and exterior).
2- Design the paneled beams draw longitudinal cross section with scale 1:20.

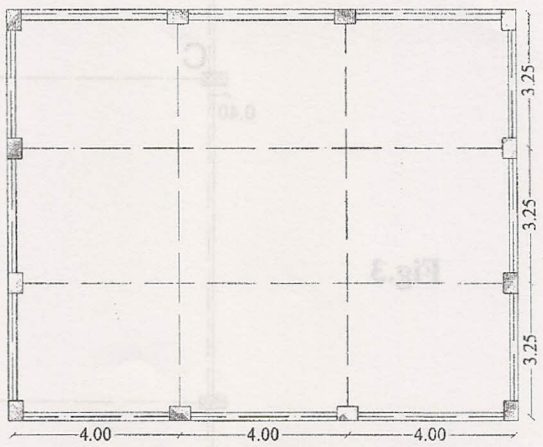

Fig.1

QUESTION (2) 20 marks

Ribbed slabs system is used to cover the slabs showed in figure 2. The terrace is solid slab type and loaded at its end by handrail with 12 cm width, 130 cm height and 10 kN/m³ density. Slab with an area of 8x8 m² is **ribbed slabs** and loaded by wall with 12 cm width, 3 m height and 12 kN/m³ density. Consider L.L.= 3 kN/m²
Flooring cover = 1.5 kN/m².

Requirements:

1- Design all slabs (ribbed slab+ solid slab).

2- Calculate necessary distances of solid parts then arrangement of ribs.

3- Draw lay out and RFT details in plan and cross sections with suitable scales.

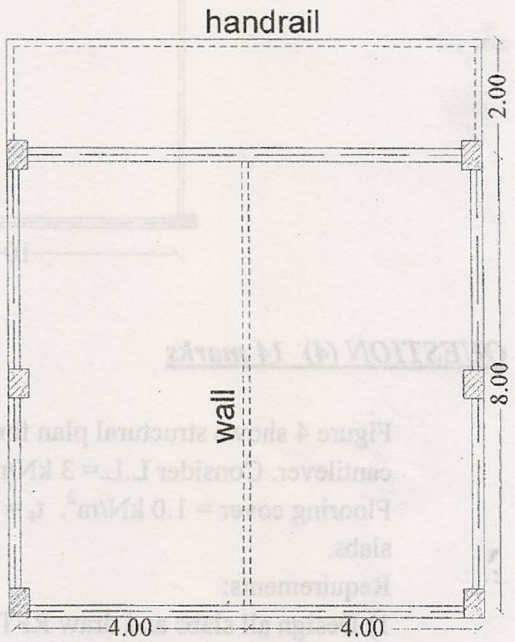

Fig.2

QUESTION (3) 28 marks

Figure 3 shows structural plan of **flat slab** system rested on columns of 400x800mm and marginal beams of 250x800 mm. The slab thickness is 300 mm. Consider L.L.= 4 kN/m² and Flooring cover = 1.5 kN/m².

Requirements:

1- Design the flat slabs then draw RFT details in a part of plan with scale 1:50.
2- Check one way shear and two way shear stresses for an internal column considering case of total loads only.
3- Check punching shear stress for column C considering case of moment transfer only.
4- Calculate loads acting on edge beam in Y-direction for torsion only. Also draw T.M.D.
5- Redraw, without scale, RFT details in all plan using mesh and added bars. Use RFT values calculated in requirement No.1.

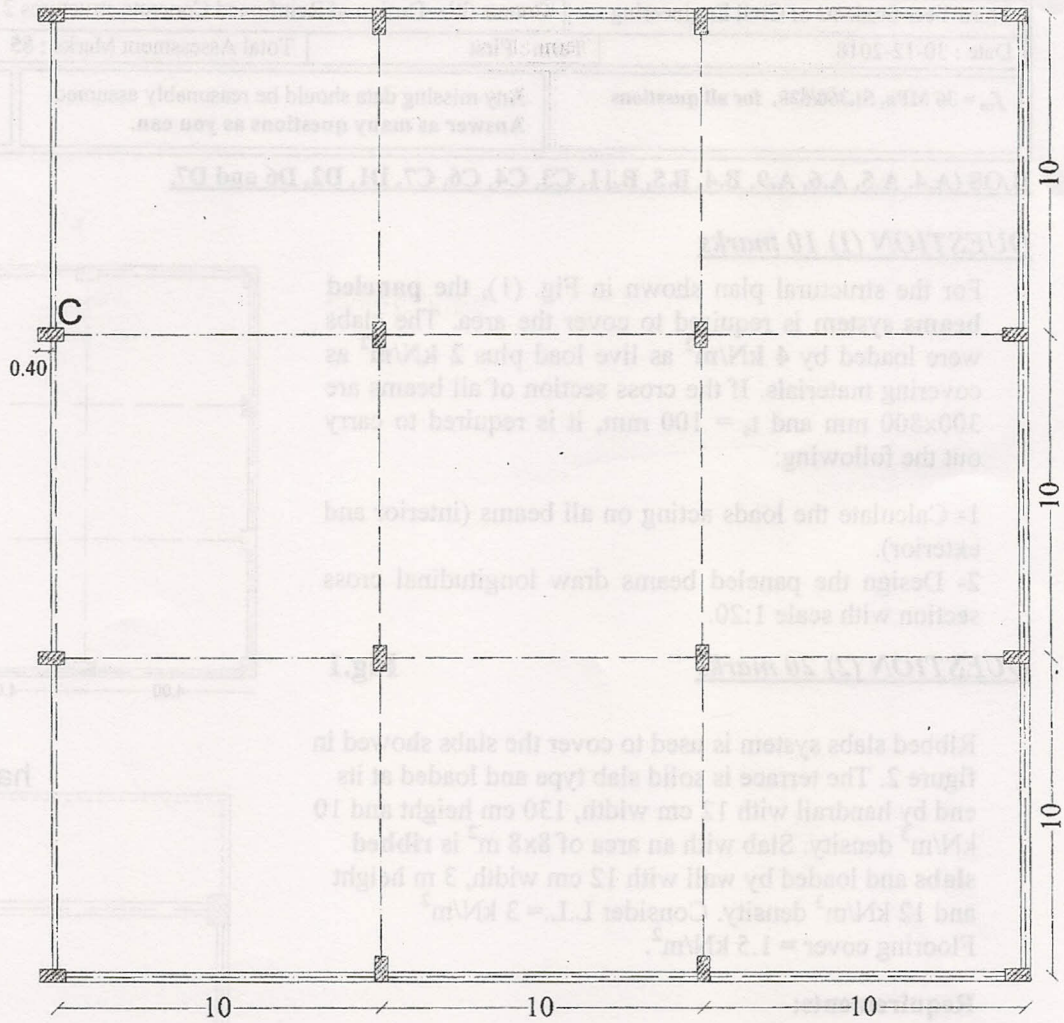

Fig.3

QUESTION (4) 14 marks

Figure 4 shows structural plan for slab and low cantilever. Consider L.L.= 3 kN/m^2 & Flooring cover = 1.0 kN/m^2. t_s = 180 mm for all slabs.

Requirements:

1) Design all slabs and draw RFT details in plan with scale 1:50.
2) Calculate loads acting on beam B and draw straining actions (BMD, SFD and TMD).
3) Design mid span section of beam B for flexure only.
4) Design section of beam B at C1 for shear and torsion only.
5) Draw RFT in cross sections of beam B without scale.
6) Calculate the forces acting on the columns C1 and C2.

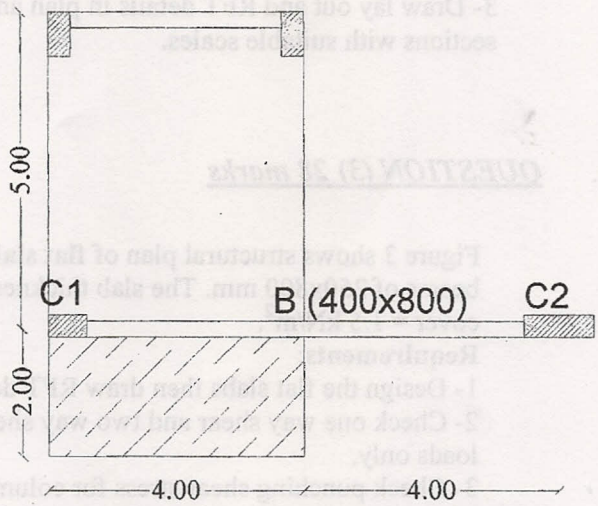

Fig.4

QUESTION (5)

(A) 12 marks

Answer with net sketches the following questions:-

1) Draw torsion cracks of cantilever beam.

2) Why torsion stirrups are closed and what is the function of longitudinal bars.

3) State how to calculate torsional shear stress for box section, give an example. What is effect of wall thickness on torsion bars?

4) All paneled beams have the same dimensions and RFT (true or false? why?).

5) State Egyptian code limits for paneled beams system.

6) How to calculate dimension of drop panel in flat slab and state effects on design steps and RFT details.

7) Is Egyptian code allows existing of opening in flat slabs? If yes, state maximum dimension of opening.

8) What are waffle slabs? State the conditions according to Egyptian code.

9) What are advantages and disadvantages of hollow block slabs?

10) What is function of: solid part, cross-rib and hollow blocks?

11) What is benefit of pang shape (مقص) of longitudinal bars in stairs ?

12) Give an example on stair illustrates the need for broken beams.

(B) 10 marks

Figure 5 shows structural plan of RC stair supported on one RC shear wall.
Design the stair and draw RFT details in plan and cross-sections with reasonable scales.

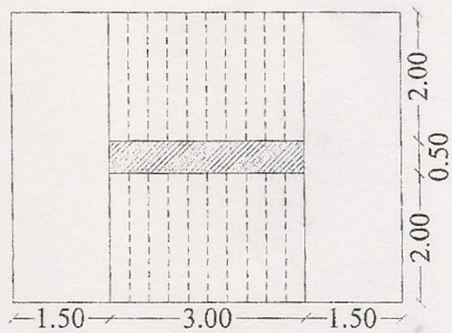

Fig.5

With best wishes

Dr/ Sabry EL-Morsy