Kafr El-sheikh University		*Second Year*
Faculty of Engineering		*Reinforced concrete Structures*
Civil Engineering Department	***2015-2016***	*Second Semester*
Final Term Exam	***Max. Degree: 75***	*Time allowed: 4 hours*

- *Any missing data may be reasonably assumed.*
- *Concrete characteristic strength for all reinforced concrete members, f_{cu} = 25 N/mm^2.*
- *Grade of reinforcing steel is 360/520 for main steel and 240/350 for stirrups.*

الإمتحان مكون من ورقتان ... مسموح بإصطحاب الجداول و مساعدات التصميم

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Question No. 1 (15 degrees)

a) Choose the correct answer:

1- ***Braced building usually have:***
   - a- *RC walls in ground floor.*
   - b- *RC walls extending the full height of the building.*
   - c- *RC walls in ground floor connected to foundation.*

2- ***In RC tied columns, the maximum spacing between stirrups should not exceed:***
   - a- *15 times the largest diameter of any longitudinal bar but not more than 200 mm.*
   - b- *15 times the smallest diameter of any longitudinal bar but not more than 200 mm.*
   - c- *15 times the smallest diameter of any longitudinal bar but not less than 200 mm.*

3- ***1) The Egyptian code states that the maximum spacing between main steel bars in solid slabs should not be more than:***
   - a- *twice slab thickness. 1.35*
   - b- *200 mm.*
   - c- *the least of them.*

4- ***Solid slabs is supplied with shrinkage reinforcement when:***
   - a- *thickness of slabs exceeds 160mm*
   - b- *thickness of slabs equals 160mm*
   - c- *thickness of slabs in the range of 160mm*

5- ***The Egyptian code states that the minimum diameter of straight bars used in solid slabs is***
   - a- *6 mm*
   - b- *8 mm*
   - c- *10 mm*

b) State which of the following is true and correct the false one:

1- *The minimum number of longitudinal bars in a square column of 400 mm side length is 4 bars*

2- *Maximum longitudinal reinforcement for a corner column is 6%.*

3- *Long term deflection may be minimized by using compression reinforcement.*

4- *The code requirements for minimum reinforcement in short tied rectangular columns 1 % Ac.*

5- *Spirals increase the carrying capacity of a column by 40%.*

Question No. 3 (60 degrees)

For the part of the structural plan of a residential building shown in figure (1); if you know that: the building consists of 10 floors (Ground + 9 floors) , Height of ground floor = 4.50 m , Height of typical floor height = 3.0 m, floor cover = 1.50 kN/m^2, L.L. = 3.00 kN/m^2, Walls exist over all beams with intensity 3.00 kN/m^2, all beams' cross section 250 × 600 mm, Hatched slab is 100 mm lower than the rest of the floor, All Columns are Fixed at Foundations.

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it is required to:

1. Design the necessary critical sections for the shown solid slabs at **section I-I**. Draw neatly, to a convenient scale on plan, the details of reinforcement for **all shown slabs**.
2. With a reasonable scale, **Sketch without any calculations** all details of reinforcement of **the continuous beam on axis (3 - 3)** in elevation and cross sections.
3. Check deflection for **simple beam (B) on axis (2-2)** at the maximum stressed section.
4. Design the **column C1 at ground floor level as a square tied column.**
5. Re-design the **column C1 at first floor level as a circular spiral column** and suggest with neat sketch the transfer connection between the ground and first floor for this column.
6. Design **the column C2 at ground floor level as a rectangular tied column** with limited width = 300 mm
7. If, for some reason, column C3 is subjected to external moments Mx=300kN.m and My= 250 kN.m, design **column C3** to accommodate the vertical load at the **fourth floor** in addition to these moments and then draw a cross section showing the details of its reinforcement.

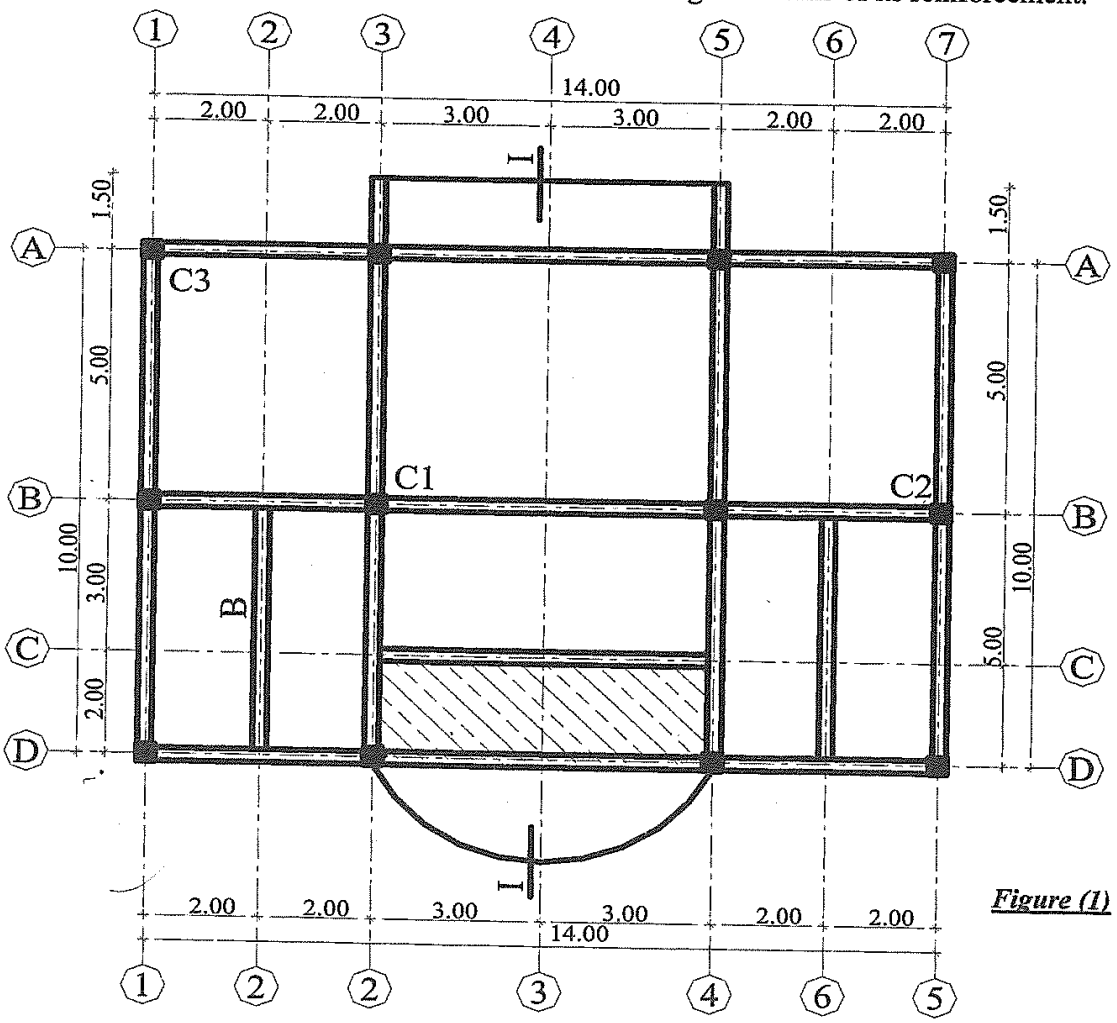

Figure (1)