King Saud University **CE 472 Reinforced Concrete II**
College of Engineering **2nd Semester 1429-1430 H**
Civil Engineering Department **Duration: 1 hr and 45 min**

First mid-term Exam

إسم الطالب : **الرقم الجامعي:**

Material data
f_c' = 25 MPa f_y = 420 MPa Concrete density γ = 24 kN/m^3 Hourdis density γ_b = 14 kN/m^3

Problem 1 (70%)
The floor shown in Fig.1 is to be designed by two alternative methods:
as a solid one way slab, and as a one way joist slab with hourdis block, of a typical section shown in Fig.2.
All beams / girders have 300 x 600 mm sections. All columns have 300 x 300 mm sections.
Superimposed dead load = 4 kN/m2, live load = 4 kN/m2. No walls used.

A – Solid slab: (35%) A 175 mm thick solid one way slab is used.
a) Check the slab thickness for the SBC-Code deflection requirements.
b) Determine dead, live and ultimate uniform load on a 1-m wide typical slab strip.
c) Determine the main reinforcement for the slab and the bar spacing, assuming a negative moment of 22 kN.m and using 12-mm bars
d) Calculate the ultimate uniform load on beam CD
e) Determine the flange width of the effective T-section of beam CD

B – Joist slab: (35%) The typical rib cross-section used is shown in Fig.2. (Ribs in Y-direction)
a) Determine the ultimate uniform load on a typical joist
b) Determine ultimate negative and positive moments in a typical joist
c) Check the flange of the joist as a plain concrete member.
d) Check the shear for the joist assuming 12-mm main bars and 8-mm stirrups.
e) Calculate the ultimate uniform load on beam CD.

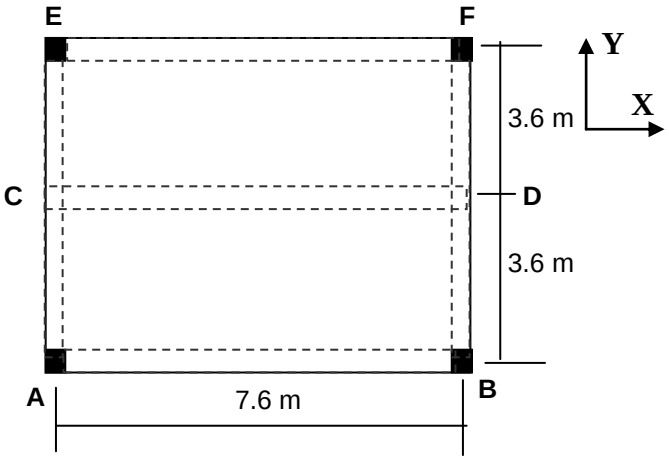

Fig. 1

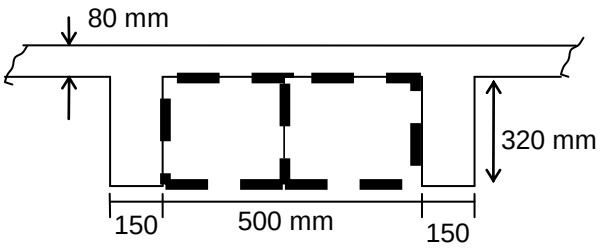

Fig. 2

Problem 2: (30%)
For the tied column of section (400 x 400 mm) shown in Fig. 3,
determine, for the P-M_x interaction curve, the following nominal and design points:
a) Pure compression point
b) Balanced point
c) Point defined by a neutral axis depth c = 100 mm
A_{st} = 8ϕ 25 Clear cover = 40 mm Tie diameter = 10 mm

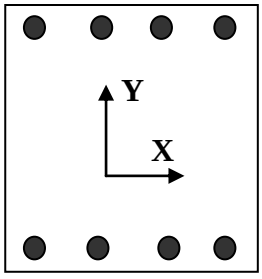

Fig. 3