King Saud University **CE 472 Reinforced Concrete II**
College of Engineering **2nd Semester 1427-1428 H**
Civil Engineering Department **Duration: 2 hrs**

First mid-term Exam

Problem 1 (80 %)

The floor shown in Fig.1, part of 4-story building, is to be designed by two alternative methods: **as a solid one way slab** and **as a void one way joist slab of a typical section shown in Fig.2**.

Design Criteria f_c'= 25 MPa fy= 420 Mpa Concrete density = 25 kN/m^3

All beams have 300 mm width and 600 mm height. All columns have 300 x 300 mm sections, and Superimposed dead load = 2 kN/m^2, live load = 3 kN/m^2, exterior walls weight = 3 kN/m^2 and wall height = 2.8 m. No interior walls used.

A – Solid slab design: A 180 mm thick solid one way slab is used.

a) Check the slab thickness for the SBC-Code deflection requirements.
b) Determine maximum design negative and positive moments in 1-m wide typical slab strip.
c) Determine the main reinforcement for 1-m wide strip assuming a negative moment of 20 kN.m.
d) Calculate the design load on beam BE.
e) Calculate the design load on beam DF.

B – Joist slab design: The typical rib cross-section used is shown in Fig.2.

a) Check the thickness for SBC code requirements
b) Suggest and show the appropriate direction of the ribs (joists)
c) Determine the design load on a typical rib.
d) Calculate the design load on beam AD.
e) Calculate the factored axial load on column A at the ground floor level.

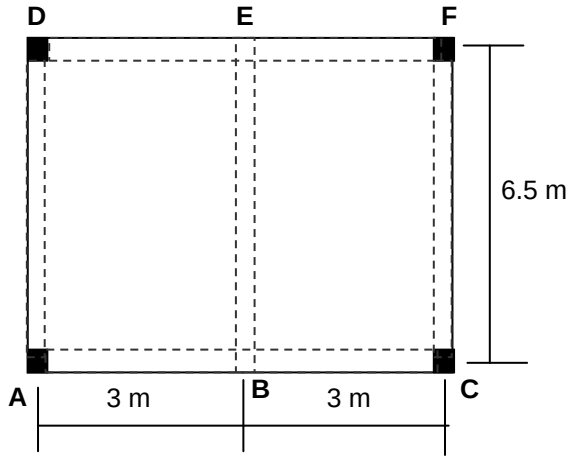

Fig. 1

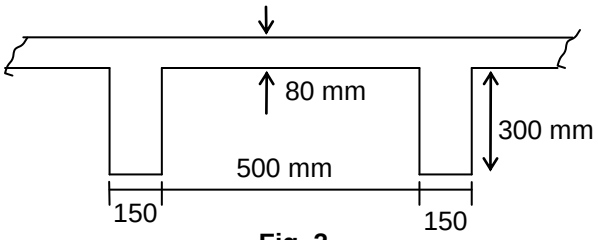

Fig. 2

Problem 2 (20 %):

For the tied column of section (500 x 500 mm) shown in Fig. 3
a) Determine the nominal axial strength in pure compression P_0 and the corresponding maximum design compression $\phi P_{n(\max)}$.
b) Design the column ties and show details.
A_{st} = 8ϕ 25 Clear cover = 40 mm f'_c = 20 MPa f_y = 420 Mpa

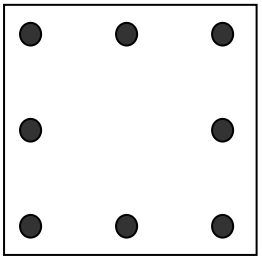
Fig. 3