

Reinforced Concrete Design (C)
Problem Set #3

NAME : _____

Schedule: _____

Instructions:

- **BOX and write your final answer/s before each question.**
- **All answer shall have a corresponding units and solution.**
- **Any form of cheating is prohibited. Anyone found or caught will be considered as **FAILED** in this exam.**

I understand all the instructions and agreed to follow all that are stated. Signature: _____

Note: Please sign before you submit or it will not be accepted.

(3pts each)

1. A rectangular beam has width of 250mm and effective depth of 330mm, $f_y = 414 \text{ MPa}$, $f'_c = 20.7 \text{ MPa}$.
 - a. Calculate the depth of the stress block
 - b. Determine the maximum design moment if the beam is singly reinforced
 - c. Find the maximum factored load that the beam can carry
 - d. Find the maximum live load that the beam can carry using the basic DL + LL.
2. A reinforced concrete beam is 250mm wide with an effective depth of 400mm. Use $f'_c = 21 \text{ MPa}$ and $f_y = 275 \text{ MPa}$. The section is reinforced with 4-25mm \varnothing bars.
 - a. Calculate the maximum steel ratio.
 - b. Compute for the nominal flexural strength
 - c. Calculate the flexural strength of the section
 - d. Calculate the safe service live load moment if the total service dead load moment is

80KN-m. Assume the basic DL + LL combination governs.

- e. If the beam is 5m long, find the maximum concentrated service live load acting at the midspan that can be supported by the beam.
3. A reinforced concrete beam is 300mm wide with an effective depth of 400mm. Use $f'_c = 21 \text{ MPa}$ and $f_y = 415 \text{ MPa}$. The section is reinforced with 5- 28mm \varnothing bars.
 - a. Determine the stress in the tension steel.
 - b. Determine the total tensile force in the steel at nominal strength.
 - c. Calculate the nominal flexural strength of the section.