



- Answer all the following question.
- Any missing data may be reasonably assumed.

يسمح باستخدام جداول و مساعدات التصميم الخرسانية

**Question No. 1 (30):-**

a) Show the types of the presented cracks Fig 1:-

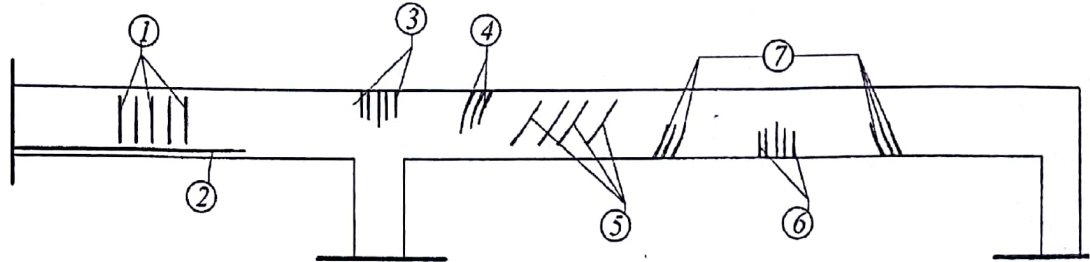


Fig. 1

b) Define briefly the following (with sketch if any):-

Reinforced concrete – Concrete compressive strength ( $f_{cu}$ ) – Young's modulus – Shrinkage – Creep – Uniaxial tensile stress of mild steel – tensile strength of concrete ( $f_t$ ) – Working & Limit state design methods – Safety margin.

**Question No. 2 (35):-**

a) Define briefly the following (with sketch if any):-

Under, Balanced and Over reinforced sections – the benefits of Compression steel.

b) Calculate the acting working D.L causing cracking moment, ( $f_{cu} = 35 \text{ N/mm}^2$ ) Fig.2 .

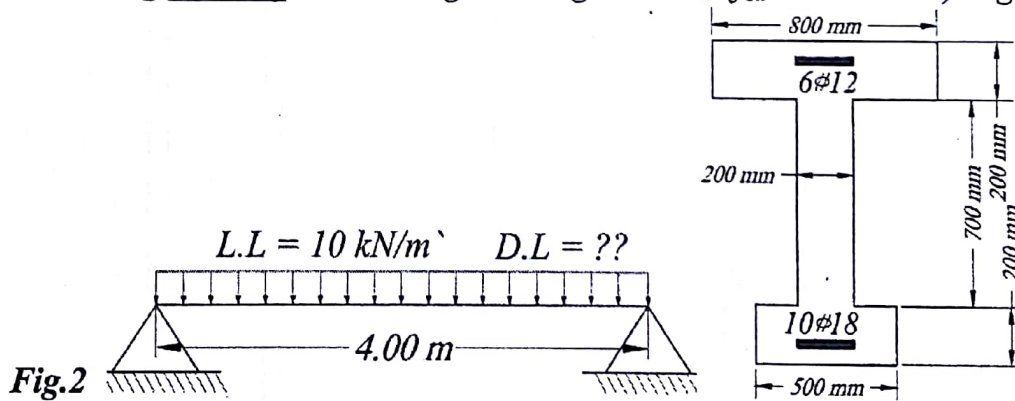


Fig.2

c) By knowing that  $f_y = 360 \text{ N/mm}^2$   $f_{cu} = 30 \text{ N/mm}^2$ , estimate the following for cross section (Fig.3):-

$M_u - A_s \text{ max} - M_u \text{ max} - A_{sb} - M_b$

d) If you know that the given section (Fig.3) is supposed to resist  $M_u = 350 \text{ kN.m}$ , execute a design section. (Note: Do not change in concrete dimensions)

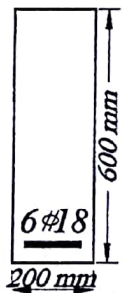


Fig.3



**Question No. 3 (40%):-**

The given structural plan is for floor slab designed based on the following data:

Slab thickness ( $t_s$ ) = 120 mm

Floor covering (F.C) = 1.50 kN/m<sup>2</sup>

Live Load (L.L) = 2.00 kN/m<sup>2</sup>

Wall density ( $\gamma_w$ ) = 12 kN/m<sup>3</sup>

Wall thickness = 25 mm

Clear height is ( $h_{wall}$ ) = 2.30 m

Column width = 500 mm

$f_{cu} = 35 \text{ N/mm}^2$  &  $f_y = 360 \text{ N/mm}^2$

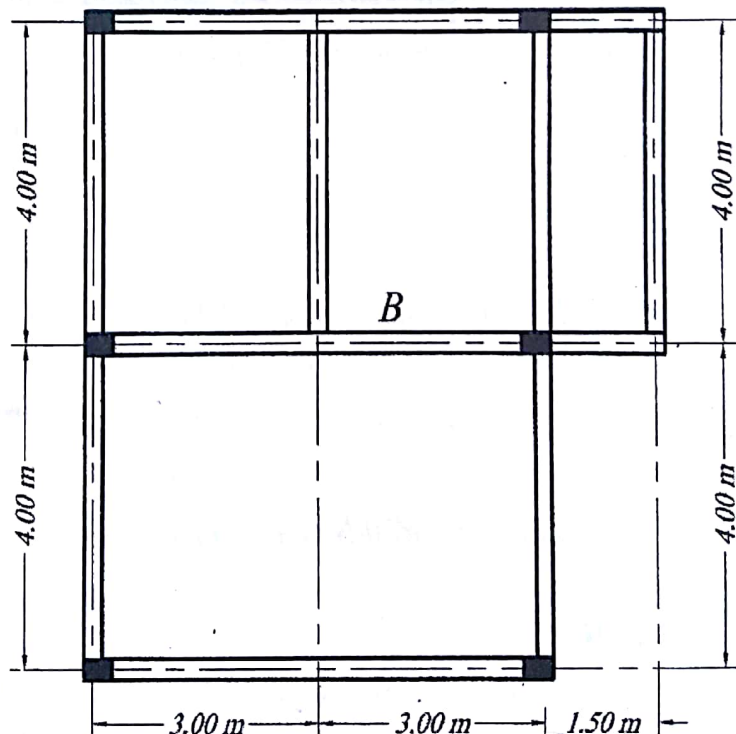
It is required to:-

1- Draw the load distribution for the given structural plan.

2- Make a full analysis and design of Beam (B).

3- With a scale of 1:25 (1.00 m = 4.00 cm for drawing), Draw longitudinal section of reinforcement details of beam B.

4- With a scale of 1:10 (1.00 m = 10 cm for drawing), draw cross sections.



I wish you all the best  
Dr. Ahmed Abd-Allah Hamoda