



- For the all questions $f_{cu}=35 \text{ N/mm}^2$ $f_y=350 \text{ N/mm}^2$ and $f_{ct}=1.8 \text{ N/mm}^2$
- Any missing data may be reasonably assumed.
- Using design aids is allowed
- The given course satisfy ILOS of A4, A14- B2, B7 and B14- C2, C5 and C8- D1, D2 and D6

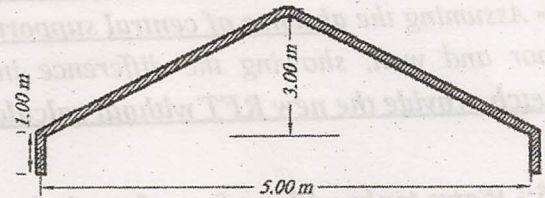
يسمح باستخدام جداول و مساعدات التصميم

Q1:- Folded Plates (15%):

It is required to provide a full design for the shown folded plate to cover a hall with an area of about $15.00 \times 40.00 \text{ m}^2$. It is required to provide the follows:-

A- Provide the total empirical dimensions and shear-friction distributions followed by full design for the given folded plate.

B- Draw RFT for plan with a scale of 1:200, and cross section with scale of 1:50.



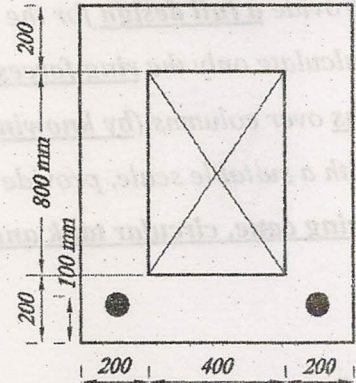
Q2 :- (Pre-stressed Concrete) (15%):

A- Define the following:-

Post-tension- Pre-tension used for pre-stressing system.

B- The shown cross section is for girder with span of 12.00 m having the following properties:-

Losses = 15% - $f_{cui} = 30 \text{ N/mm}^2$ - $f_{cu} = 45 \text{ N/mm}^2$ - $f_{up} = 2000 \text{ N/mm}^2$ - $f_{yp} = 1700 \text{ N/mm}^2$ - D.L = 12 kN/m (without OW) - L.L = 10 kN/m .



It is required to provide the followings:-

- 1- According to ECP calculate the pre-stressing force in the service stage (P_e) assuming no tension is allowed.
- 2- Estimate amount of steel required for the cable at service stage (A_{ss}).
- 3- What will be the safety of such section at initial stage.

Q3 :- Cylindrical Shells (15%):

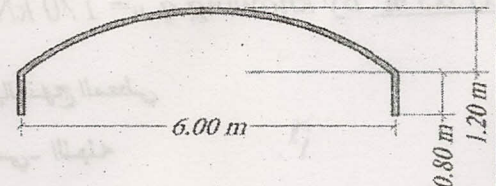
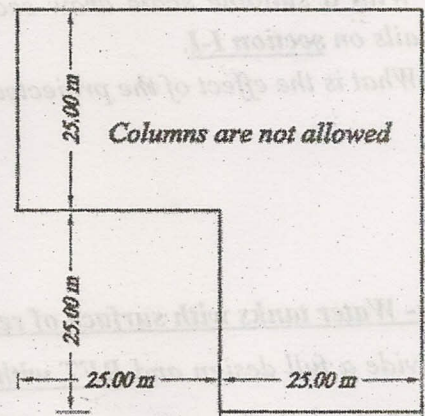
The given hall with an area can be estimated by 1875 m^2 , if you know that the Cylindrical shell system shown in figure is supposed to cover the shown hall It is required to :-

A- Sketch the best lay-out to employ the cylindrical shell to cover the hall

B- Provide the total empirical dimensions and loads acting over cylindrical shell.

C- Without calculation show how to provide full design.

D- Assuming that beam-less cylindrical shell, for ONLY one bay, Draw RFT for plane with scale of 1:200, and cross section with scale of 1:50.

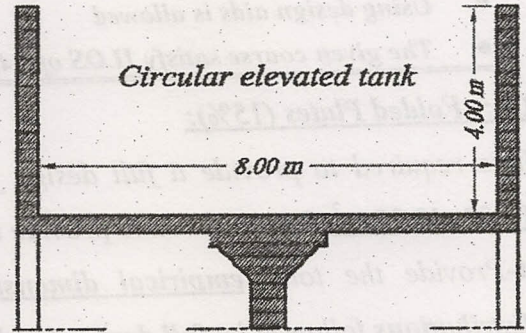




Q4:- Circular tanks (20%):

The shown figure is for circular tank with central support with 2.00 m diameter and 8 columns in the outer perimeter, provide the follows:-

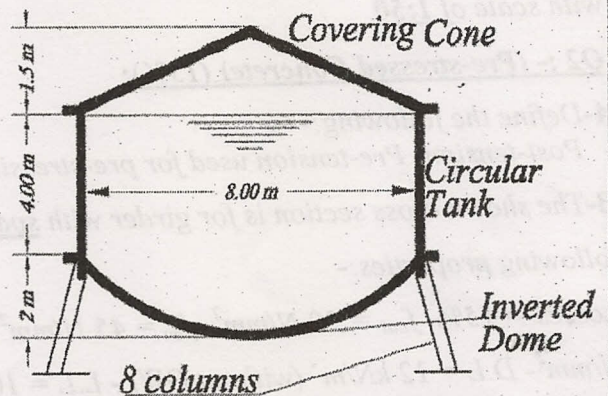
- A- Draw the final straining action acting on wall and floor.
- B- Design critical sections, $f_{ct} = 1.8 \text{ N/mm}^2$.
- C- With a suitable scale provide RFT (Cross section & plan).
- D- Assuming the absence of central support, what will happen in the floor and wall, showing the difference in straining action, with sketch provide the new RFT without calculation.



Q5:- Water tanks with surface of revolution shapes (18%):

For the shown tank, it is required to carry out the follows:-

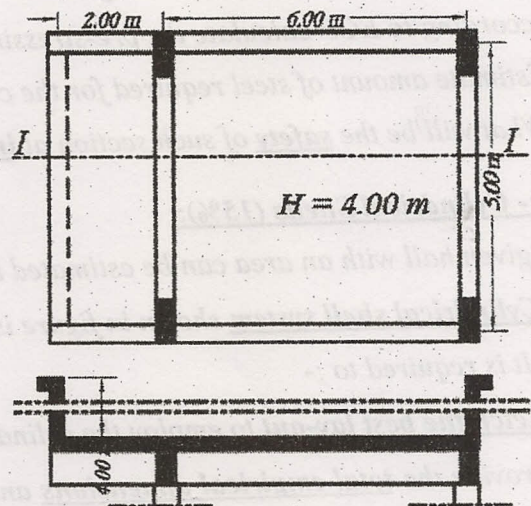
- A- Provide a full design for the shown tank.
- B- Calculate only the ring forces for horizontal and vertical beams over columns (by knowing 10 columns).
- c- With a suitable scale, provide sectional elevation, plan for covering cone, circular tank and inverted dome.



Q6:- Rectangular tanks (15%):

The shown figure rectangular tank; provide the follows:-

- A- Calculate loads acting on strip I-I, draw B.M.D, N.F.D then design critical sections.
- B- With a suitable scale draw sectional elevation showing RFT details on section I-I.
- C- What is the effect of the projected beam on floor and wall.



Q7:- Water tanks with surface of revolution shapes (12%):

Provide a full design and RFT without scale for rectangular tank rested on rock soil with volume equaled to $15 \times 15 \times 3 \text{ m}^3$ By knowing $q_{all} = 170 \text{ kN/m}^2$.

مع أخلص و اصدق دعواتي القلبية بالاستفادة الكاملة بالمنهج المعطي

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