



Subject: Building Construction
Division: Structure
Examiner: Dr. Qais Jawad Frayyeh

Year: Second
Time: 3hrs.
Date: 25 /05/2016

Note: Answer only four questions

Q1/ Draw with suitable scale longitudinal section for concrete column with cross section is 50*50cm with six bars of reinforcement ($\varnothing 25$) and ties $\varnothing 10 @ 250$ mm based on isolated foundation 300*300*50 cm with one layer of steel reinforcement 13 bars ($\varnothing 20$) in two directions. Enhance your drawing with form work for column and full details and dimensions. (25%)

Q2/ What are the main objective of using:

- Tie beam between isolated foundations.
 - Pier foundation
 - Gypsum paste for construct Jack arch floor of brick
 - Flat slab.
 - Vibrators during lying of concrete.
- (25%)

Q3/ Write a brief comment about advantage and disadvantage of concrete piles (precast and cast-in-situ) (25%)

Q4/ Complete these sentences:

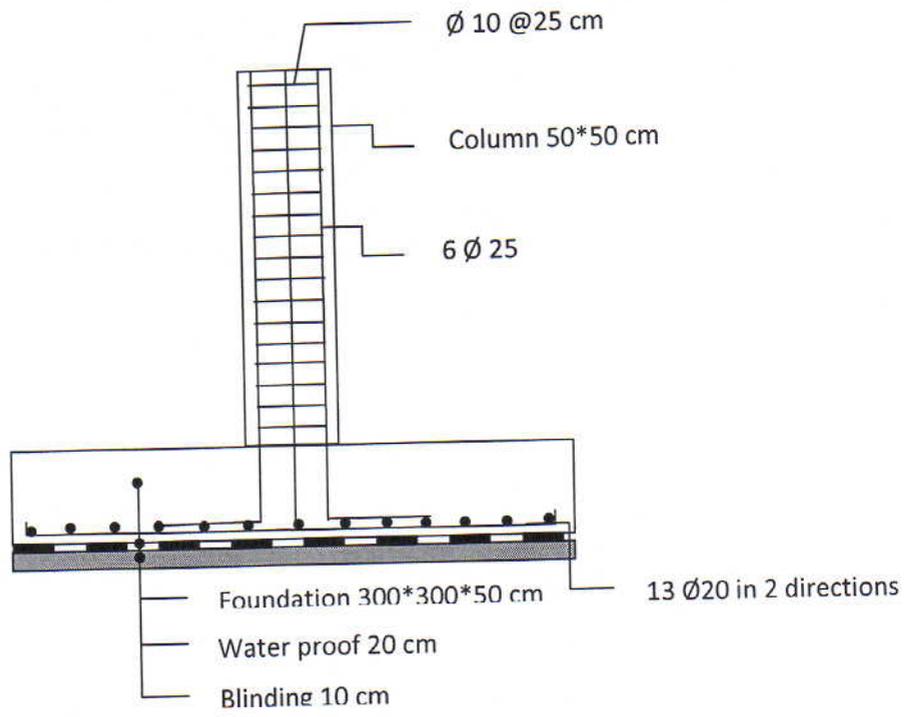
- Depth of foundation influenced by the following factors..... (5%)
- The statement (Formwork should be true) mean that..... (10%)
- Many processes for raw materials have to taken to avoid the problems of hot weathering and these include:.... (10%)

Q5/ Discuss the followings:

- Ribbed slab, enhance your answer with details. (15%)
- What are the main points to be care during lying of concrete? (10%)

Typical answers

Q1/



Q2/

- a. to avoid differential settlement
- b. Pier foundation can be use when it is impossible to use raft or pile foundation and when the area of the base of the pier is enough to distribute the loads on the subsoil
- c. due to its faster setting
- d.

The advantages of flat slab construction are:

- i. No projection of beam is visible and hence no additional ceiling is needed.
- ii. More clear head room is available.
- iii. Better lighting facilities are available
- iv. For heavier loads, thinner section of the slab is needed.
- v. The construction is easy.

e.

We compact concrete with good efficiency, so we can:

- 1. Decrease w/c ratio and it means more strength and low shrinkage
- 2. Can compact the concrete with high thickness
- 3. More dense of concrete and low voids and it means good quality and low permeability of concrete
- 4. More penetration of concrete between bars and good shape
- 5. Ability to use mixes with low workability and this mean high strength
- 6. Decrease the time to remove side forms and this is very important for production of tiles and blocks

Q3/

Advantages of precast concrete piles:

- i. Best concrete can be prepared by proper workmanship. Any defect can immediately repair.
- ii. The reinforcement remains in proper position and does not get displaced.
- iii. The concrete has only to withstand loads after complete curing has taken place.
- iv. They can be cast before hand and a quick driving progress can be ensured.
- v. They are more convenient through wet conditions.
- vi. They are more suitable when a part of their length is to remain exposed.
- vii. They are not affected by any other additional forces which act on them while adjacent piles are driven.

Disadvantages of precast concrete piles:

- i. They are heavy and difficult to transport.
- ii. Lapping of additional length means extra cost, labor and energy.
- iii. They have to be heavier in section to withstand the handling stresses.
- iv. The shocks of driving make them weaker.

Advantages of cast- in- situ piles:

- i. There is less wastage of material as exact length of pile is cast.
- ii. The time spent on curing etc. is saved.
- iii. They can bear heavier loads by improving upon their cross sectional profile, e.g. Pedestal piles

Disadvantages of cast- in- situ piles:

- i. Good quality concrete cannot be easily obtained due to unusual height of dumping.
- ii. The reinforcement is liable to get displaced.
- iii. They cannot use under water.
- iv. The green concrete loses strength after coming in contact with the soil.
- v. The shells are affected by casting additional piles adjacent to them.

Q4/

a.

Depth of foundation influenced by the following factors:

1. Types of soils and its layer which can carry loads of building.
2. Climate situation and how to avoid the affect of freeze and extension and contraction, so the foundation must be not less than 30cm depth to avoid these affects.
3. Groundwater level and how to construct foundation above water table level
4. Foundation location on the building and if there is basement, shelter, car park ...etc. in the building.
5. Existing building foundation close to new foundation..
6. Underground services and their relationship with the depth of foundation.
7. Provision of existing trees.

b.

Formwork should be true: This means that the formwork should be erected in such a manner that all the faces of concrete are true with respect to the drawings.

c.

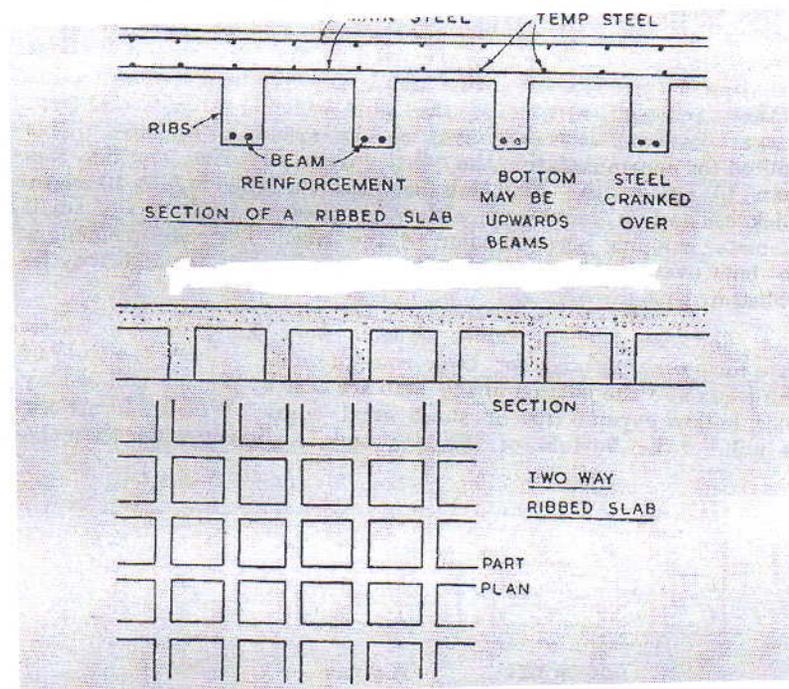
- a. Mixing water: Chilled water must be used or artificial ice. The use of artificial ice with 50% instead of mix water reduces 11°C.
- b. Cement: Avoid new grinding cement in concrete works
- c. Admixtures: Use of retarders type B or super plasticizers type D according to ASTM C494-71
- d. Aggregate: Store the aggregate in shadow place and spread the coarse aggregate with water

Q5/

a. Ribbed slab:

Ribbed slab floors consist of a number of small beams spaced closely and cast monolithically with the slab. In the ordinary slab, the area of concrete below the neutral axis of the section does not contribute to the increase in strength of the section. Its object only to hold the reinforcement in position. Generally ribs are not less than 10cm width. The slab between the ribs is 5 to 10 cm in thickness and is reinforced with wire mesh or with bars of small diameter running perpendicular to the ribs.

The cost of such ribbed slabs is very high due to intricate formwork needed for their construction. Hence the sides of the joists and the bottom of the slab are cast by placing hollow clay tiles, hollow gypsum tiles or sheet steel cores. Wooden form work is built for the bottom of the ribs and slightly wider than the width of the ribs so that the tiles can rest on it.



b.

1. Laid the concrete within 30 minutes from the time of add water in cold weather and 20 minutes from the time of add water in hot weather
2. Be careful in laid of concrete without any vibrating in forms and avoid to stock the concrete in one place
3. Avoid to threw the concrete from 1.5 meter because it due to segregate the concrete components, so openings may be done in columns and walls and chutes used with 1:3 slope to carry concrete
4. For walls, horizontal layers according to the required thickness with 1.5 meter in cold weather and 1 meter in hot weather and be careful to avoid initial setting and pressure in fresh concrete.
5. Don't cast in rain day
6. Be careful in laid of concrete in slop surface and cast start from down to up without forms for low slope and with temporary form for high slope
7. For columns and walls, prefer to decrease w/c ratio for upper layers
8. For slabs supported in columns and walls, cast cannot start before 3 hours of casting of columns and walls