



**University Of Technology**  
**Building and Construction Eng. Dept.**  
**Final Exam –2012/2013 1<sup>st</sup> Attempt**

**Subject : Const. of Hydraulic Struc.**  
**Branch : Water and Dams Eng.**

**Class: Second**  
**Time : 3 Hours**  
**Date :12/ 6 /2013**



**Answer Five Questions only**

**Q1: Complete the followings:**

- 1- The kinds of clay bricks are 1----- 2----- 3----- 4----- 5-----
- 2 -The characteristics of normal Portland cement are the following s  
1----- 2 ----- 3 ----- 4 -----
- 3- The water and wastewater treatment plants are supplied by different services, including 1-----2 -----3-----4-----
- 4- The rocks are classified due to their physical and chemical properties into 1----- 2----- 3-----
- 5- The concrete admixtures can classified into major categories ,are  
1----- 2----- 3----- 4-----

**((20 degrees))**

**Q2 : Give the reasons for the followings:**

- 1-The more commonly used materials for filter media in IRAQ is the sand.
- 2 -The using of stirrups reinforcement in concrete beams.
- 3- Division of all buildings broadly into light and heavy buildings.
- 4- The sludge treatment tanks are locked.
- 5- The use of low temperature Portland cement in dam's construction.

**((20 degrees))**

**Q3: Explain in drawing the details for the followings:**

- 1- Over hanged beam.
- 2- Isometric of brick wall showing the bed and perpendicular joint
- 3- Moderate angle arch giving the number of centers .
- 4- Inverse T-section and I-section of standard precast and pre-stress beams .
- 5- Section in water joint.

**((20 degrees))**

**Q 4: A) – classify the followings:**

- 1- The main types of hydroelectric power generation which are operating with storage water
- 2- The single center arches or radial arches .
- 3- The brick walls.
- 4- The main coating materials used for coating banks of rivers and channels .
- 5- The fish passages.

**B ) State the principles which must be taken into account in Casting of concrete for various parts of structures.**

**((20 degrees))**

**Q 5: A) Answer the followings:**

**1- State the points which must be taken into account when the Stone used in the construction .**

**2-State in details the equipments used in casting concrete .**

**B) State the points from which we note the impact of vertical loads in the stability of bricks construction.**

**((20 degrees))**

**Q 6: Answer the followings:**

**A-) Define with details the belly arch , direct line in arch , height of arch , space of arch ,and supports .**

**B-) State in details the special structures which are used in control erosion .**

**((20 degrees))**

**With our best wishes for your success**

# الاجابة الامر ذبح ~~طابقا~~ وانت انت ماشي الصناعات وضع هذه المياه يعود

Q.1:

- 1- Surface brick, Paving brick, Firebrick, hollow brick, glazed brick.
  - 2- Smoothness, coherence, tensile stress, pressure effort.
  - 3- staff rooms, maintenance building, stores, roads, gardens, fences.
  - 4- Amorphous silicon rocks, limestone, sand rocks.
- 5- Retarding admixtures, Accelerating admixtures, Super plasticizers, Water reducing, Air entraining.

Q.2

- 1- availability and cheap prices and no change in natural or chemical properties over time.
- 2- To resist the radial tensile stresses and prevent the occurrence of diagonal cracks at both ends of the beam.
- 3- Depending on the method of transmission forces through its members during construction.
- 4- To achieve anaerobic conditions for anaerobic bacteria to do its job in the process of anaerobic treatment.
- 5- To reduce the heat generated from the interaction in sclerosis and this time less amounts expansion and shrink and less occurrence of cracks in concrete.

Q-3

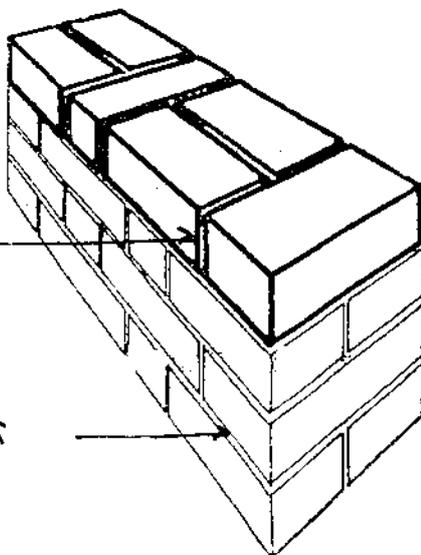
1-)



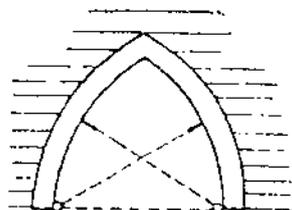
2-)

perpendicular joint

bed joint

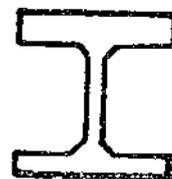


3-)

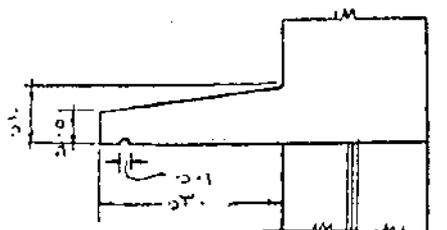


Two-centers

4-)



5-)



Q-4

A-)) 1-)) 1-stations that arise in the course of river.

2- Stations that constructed within the dam. and their types are:

a- The stations which are established in the course of river.

b- Standard stations ~~with~~ with water surplus bank.

c- stations operating by storage pumping water.

2-)) 1- half circular arches.

2- sector arches.

3- horseshoe arches.

4- hanging arches.

3-)) 1- fencing walls

2- Bearing walls.

3- Retaining walls.

4- Partitions

5- Thermal walls

6- Short walls

external  
internal

4-)) 1- Broken stones

2- Sand and sandy clay

3- Woods.

4- Herbal material

5- Metal.

5-)) 1- slopping stream ladder.

2- pond ladder.

3- stepped ladder.

B-))

- 1 - When the concrete casting in the foundations or sites that contain water should first conduct the withdrawal of all the water in the sites with the casting surfaces and cleaning clay and debris, and other exotic materials. In the case of the presence of continuous water in casting site that should be disposed of by pumping off-site casting and must be carried out this process without influence a concrete which was casting recently.
- 2 - The materials of stony concrete and other exotic materials must be removed from interior surfaces of the concrete blocks, as well as the inner surfaces of equipment for mixing and casting concrete.
- 3 - not allowed to use equipments of transport concrete, which have the effect of the flow of concrete from theirs .
- 4 - a concrete to be taken out from the mixing equipments or transport vehicle to the place of the final situation continuously and as quickly as possible without breaking or loss of its materials until to be complete the casting to the construction part process. The concrete that which is subject to freezing primary because they left for a period (43 minutes) should be negligible.
- 5 - Not allow to cast the concrete from rising more than (1.5) m ,and if necessary it must use cone or nose that the process is beyond the control of the quantity of them in order to remove the separation condition in concrete materials and in the same time is to maintain the homogeneity of the concrete mixture cast in the constructional unit .
- 6 - The process of compaction must be used by compacted with rod or by using the vibrators which is the important process in the concrete casting .

Q-5 :

A-) 

- 1 - Resist the side pushing forces only.
- 2 - The level of layers is perpendicular to the side pushing forces.
- 3 - In the case of side pushing , the resultant should be a summation of all forces in the construction laying in the middle third of any section driving in the wall.
- 4 - The resultant of the forces acting vertically and decentralization to the wall in the middle third of the cross-section to it.

2/ There are several types of concrete mixtures used according to the amount of concrete required. Mechanical mixtures used when casting a limited amount of concrete, as in small structures. Mechanical mixtures are transported by wheels that are installed on it and pulls by any means of pull equipments. Also be equipped with diesel engines for the purposes of recycling.

However, if the amount of concrete required are large and not fit with the production capacity of mechanical mixtures, so that the central mixtures are used which are mostly built in the workplace in order to be able to process quantities of concrete on an continuous way and as required , like in the case of dams that require the large quantities of concrete. As it is used to the concrete pumps for this purpose.

The concrete pumps often consist a basin to receive concrete in its base there is an opening leading to the two cylinders moving through their two piston which are pulled the concrete to steel hose (or sometimes rubber) and where the non-return valve for concrete as shown in

- B -)) A - load a specific area of land above the upper limit of its durability.  
B - concentration of loads on an irregular basis on the ground flaccid.  
C - When the outcome of the non-vertical loads on the soil it which leads to the possibility of sliding some layers of incompact soil .  
D - the non-central loads.

Q.6 :

A -))

Belly : is the inner part of arch and be concave.

Direct Line: The line linking the supports and from it the high and space of arch be measured.

Space: The horizontal distance between the heels of the arch from the inside.

Height: The vertical distance between the level of supports of arch and the highest point in the belly of the arch.

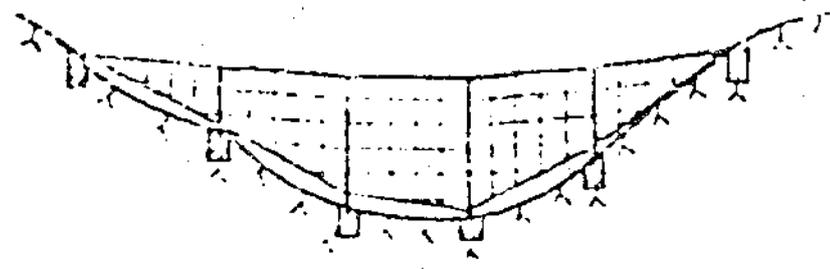
Supports: Structural parts are assigned the heels of arch, which must be resist the vertical loads in addition to lateral forces which requires the provision of structural details to resist these forces.

B)) 1 - Objectors Networks barriers:

These barriers are implemented from steel ropes, and used for the detention of solid material floating in the floods flowing.

This type consists of two hanging networks in the banks and bottom of narrow waterway, where the bottom network has resist the stream water flow and partially differentiated it, and the second network has resist the remaining impacts of the water flow.

shows this type:



2 - Processes semi-Objectors barriers:

These barriers are used for several purposes including increasing the current carrying capacity with reduced water depths and reduce the deposition of alluvial materials.

The cross-section of this type is usually in the form of trapezoidal. When the site was mentioned barriers is near the surface of the waterway this case increased the intensity of the impact of water, and the water leading to increase the sides slope of the stream

3 - Earth longitudinal barriers:

The impact of this type of barriers on the stream of water is less than the impact of the types listed above. That it is constructed in parallel with the stream water and the base of barrier should be protected from erosion through the coating of the base, by protective layer of stone.

4 - Earth barriers protective the flood:

These barriers are constructed to protect the floodplain from the immersion by the flood water. And are constructed from the soil available in site. It is a low-depth earth dams. Differ from those constructed in the streams of the rivers, as it does not repels the surplus water only for a little time. The shape of the cross-section of these barriers is in the form of trapezoidal!