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Internal Assessment Test 1 – September 2016

Sub:	Building Materials and Construction				
Date:	08/09/16	Duration:	90 mins	Max Marks:	50
Sem:	3				

Code:	15CV36
Branch:	CV

**Note: Answer to the point. Sketch figures wherever necessary**

**Answer all questions:**

1) a. Explain briefly i) Header ii) Stretcher iii) Queen closer iv) King closer with sketches. **(5 Marks)**

Header – Brick when laid parallel to its breadth . In modular bricks, it shows the face of 90mmX90mm.

Stretcher- Brick when laid parallel to its length. In modular bricks, it shows the face of 190mmX90mm.

Queen closer – portion of the brick cut length wise

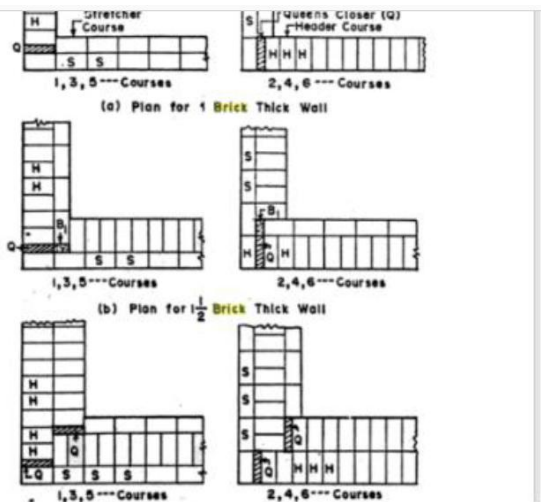
King closer – portion of the brick obtained by cutting triangular piece half along its length and half along its breadth

b. Mention five rules for a good bond in Brick masonry. **(5 Marks)**

1. The bricks should be of uniform size. The length of the brick = width of brick + one joint , so that uniform lap is obtained.
2. The amount of lap should be ¼ brick length and ½ brick thickness.
3. Use of brick bat should be discouraged.
4. Vertical joints in alternate courses should be along the same perpend.
5. The stretcher should be used only in facing.
6. In alternate courses centreline of header should coincide with the centre of the stretcher in the course above or below it.
7. It is preferable to provide every sixth course as header course on both sides of the wall.

c. Differentiate *English* and *Flemish* bond with sketches. **(6 Marks)**

English bond



It is most commonly used type of bonds.

b) It consists of alternate courses of headers and stretchers and it is strongest bond. Vertical joints of header courses come over each other.

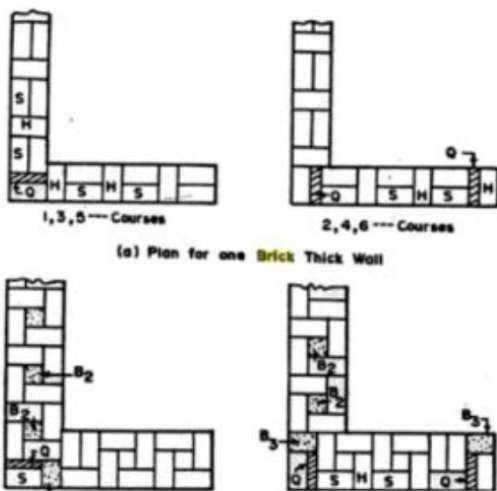
c) Similarly Vertical joints of stretcher courses come over each other.

d) It is essential to place quoin closer after a quoin header in every alternate course.

- e) Every header comes centrally over the joint between two stretchers in course below.
- f) In stretcher course there should be a minimum overlap of 1/4 their length over headers.
- g) A header should never start with the queen closer as there are more chances of displacement.
- h) Since joints in the header course are more than joints in the stretchers, joints in the header courses are made thinner.

**Flemish bond**

- a) Every course consists of alternate header and stretcher in the same course.
- b) The facing and backing has same appearance
- c) Quoin closers are kept next to quoin headers
- d) For walls having even multiples of half bricks no bat are used
- e) For walls having odd multiples of half bricks ,half bats and three fourth bats
- f) are used



2) a. Explain about various classification of bricks.

(8 Marks)

**Classification of bricks**

Class I	Class II	Class III	Class IV
Table mounted	Ground mounted	Ground mounted	Over burnt
Burnt in Kiln	Burnt in Clamp	Burnt in Clamp	Burnt in Clamp
Regular in size and shape	Hair line cracks	Irregular & Distorted Edge	Dark colour
Water absorption not greater than 20% by weight	Water absorption not greater than 22% by weight	Water absorption not greater than 25% by weight	Water absorption not greater than 25% by weight
Superior work	Used where plaster coat is given	Temporary work	Used as an aggregate for foundations and floors

b. What are the causes of deterioration of stone?

(8 Marks)

1. Rain water - Rain water acts both physically and chemically on stones. The physical action is due to the erosive and transportation powers and the latter due to the decomposition, oxidation and hydration of the minerals present in the stones.
2. Wind – It carries fine particles of dust , when it blows at high speed particles will strike against the stone surface and thus stone will decayed. The wind allows rain water to enter pores of stones with force. Such water on freezing, expands and splits the stones.
3. Vegetable growth – The creepers and certain trees develop on the stone surfaces with their roots penetrating in stones joints. Such roots attract moisture and keep the surface damp. At the same time, they may try to expand also, resulting in stone decay.

- 4. Alternate wetness and drying – Stones are made wet by various agencies such as rain, frost, dew etc. It is found that stones subjected to such alternate wetness and drying wear out quickly.
- 5. Living organisms – Some living organisms like worms and bacteria act upon stones and deteriorate them.
- 6. Nature of mortar – The nature of mortar used as a binding material may react chemically with any one of the constituents of stones and thus lead to disintegration of stones.

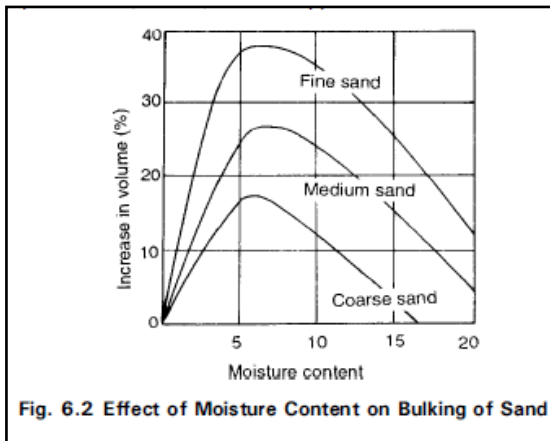
c. Define Flakiness and Elongation Index. (2 Marks)

The flakiness index of aggregate is the percentage by weight of particles in it whose **least dimension is less than 0.6 times of their mean dimension.**

The elongation index on a aggregate is the percentage by weight of particles whose **greatest dimension is greater than 1.8 times their mean dimension.**

3) a. Define bulking of sand and its significance. (5 Marks)

The increase in the volume of a given mass of fine aggregate caused by the presence of water is known as **bulking**. The water forms a film over the fine aggregate particles, exerts force of surface tension and pushes them apart increasing the volume. The extent of bulking depends upon the percentage of moisture present in the sand and its fineness. With ordinary sand bulking varies from 15-30 percent. It increases with moisture content up to a certain point (4-6%), reaches maximum, the film of water on the sand surface breaks, and then it starts decreasing.



In preparing concrete mixes if sand is measured by volume and no allowance is made for bulking, the moist sand will occupy considerably larger volume than that prepared by the dry sand and consequently the mix will be richer. This will cause, less quantity of concrete per bag of cement. For example, if the bulking of sand is 10% and if mix ratio is 1:2:4, the actual volume of sand used will be  $1.1 \times 2 = 2.2$  instead of 2 per unit volume of cement. If this correction is not applied the actual dry sand in the concrete will be  $1 / 1.1 \times 2$ , instead of 2 per unit volume of cement. The mix proportion then would be 1:1.82:4 rather than 1: 2: 4 which indicates lesser production of concrete. Also, there will be chances of segregation, honeycombing and reduced yield of concrete.

Bulking of sand can be determined, in field, by filling a container of known volume (A) with damp sand in the manner in which the mixer hopper will be filled. The height of sand in the container is measured. The sand is then taken out of container carefully, ensuring no sand is lost during this transaction. The sand is made damp by increasing the moisture content. Then the new depth of aggregate in the container gives the bulked volume (B).

$$\frac{B - A}{A} \times 100$$

Then Percentage bulking is found using formula, .

b. Define Aggregate Impact value.

Also explain the experiment conducted to determine the Impact value  
It is a measure of resistance of aggregate against Impact or sudden loads.

**(6 Marks)**

**Test procedure**

- The test sample consists of aggregate which passes a 12.5 mm sieve and is retained on a 10 mm sieve.
- The aggregate comprising the test sample is dried in an oven for a period of four hours at temperature of 100-110°C and cooled.
- It is filled in three layers with 25 strokes and the surplus aggregate is struck off, using the tamping rod as a straight-edge.
- The net weight of aggregate in the measure is determined to the nearest gram (weight A).
- A steel cup, 102 mm internal diameter and 50 mm deep, is fixed firmly in position on the base of the machine and the whole of the sample is placed in it and compacted by a single tamping of 25 strokes of the tamping rod.
- The hammer (13kg) is raised until its lower face is 380 mm above the upper surface of the aggregate in the cup, and allowed to fall freely.
- The test sample is subjected to 15 blows each being given at an interval of not less than one second.
- The crushed aggregate is then removed from the cup and the whole of it is sieved on 2.36 mm IS sieve.
- The fraction passing the sieve is weighed (weight B).

Aggregate Impact value =  $B/A \times 100$

This value should not be more than 30% for concrete used in runways, roads etc and 45% for aggregate used in concrete.

c. Draw the plan and elevation of alternate courses of 1 1/2 thick English bond. (5 Marks)

