Department of

Civil Engineering

LAB MANUAL

Design of Concrete Structure-1

B.Tech– IV Semester

KCT College OF ENGG AND TECH.

VILLAGE FATEHGARH

DISTT.SANGRUR

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Experiment No:1 SLUMP CONE TEST

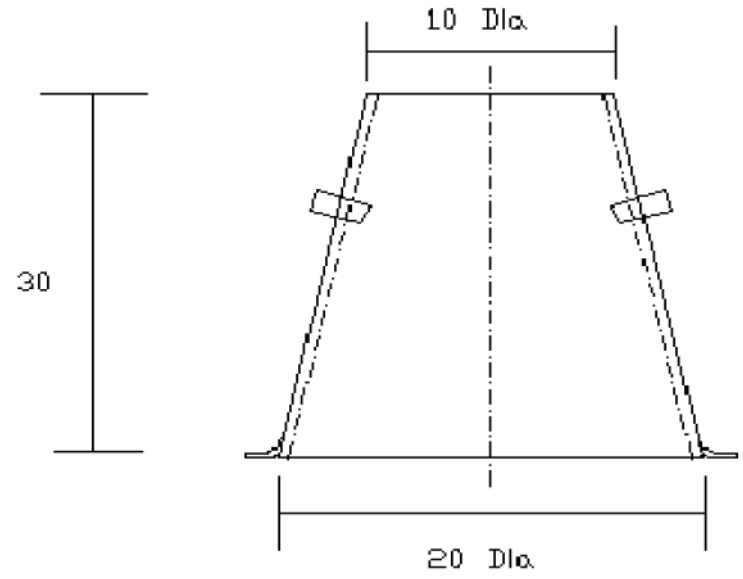
Aim: To measure the consistency of concrete by using slump cone **Apparatus required:** Slump cone, tamping rod, metallic sheet.

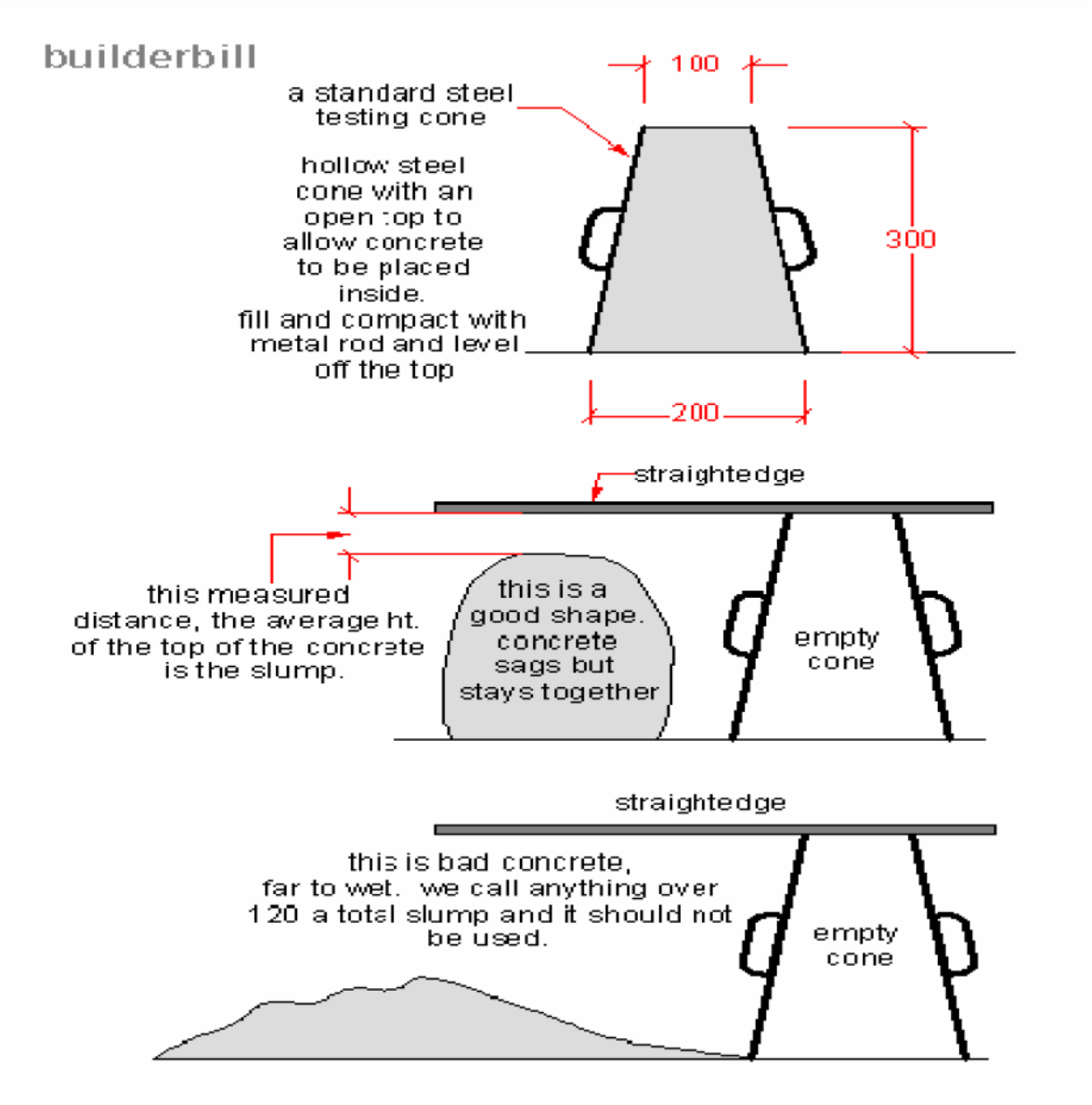
Procedure.

1. The internal surface of the mould is thoroughly cleaned and freed from superfluous moisture and adherence of any old set concrete before commencing the test.
2. The mould is placed on a smooth, horizontal rigid and non – absorbent surface.
3. The mould is then filled in four layers each approximately ¼ of the height of the mould.
4. Each layer is tamped 25 times rod taking care to distribute the strokes evenly over the cross section. After the top layer has been rodded, the concrete is struck off level with a trowel and tamping rod.
5. The mould is removed from the concrete immediately by raising it slowly and carefully in a vertical direction.
6. This allows the concrete to subside. This subside is referred as slump of concrete.
7. The difference in level between the height of the mould and that of the highest point of the subsided concrete is measured. This difference in height in mm is taken as slump of concrete.
8. The pattern of slump indicates the characteristics of concrete in addition to the slump value. If the concrete slumps evenly it is called true slump. If one half of the cone slides down, it is called shear slump. In case of a shear slump, the slump value is measured as the difference in height between the height of the mould and the average value of the subsidence. Shear slump also indicates that the concrete is non-cohesive and shows the characteristic of segregation.

Result: The slump value of the concrete is _____ **Viva Voce:**

1. What is meaning of Consistancy in concrete?
2. What is slump of concrete?
3. What is the significance of shear slump?
4. What is segregation?


10 Dia
30
20 Dia


builderbill
100
a standard steel testing cone
hollow steel cone with an open top to allow concrete to be placed inside.
fill and compact with metal rod and level off the top
300
200
straightedge
this measured distance, the average ht. of the top of the concrete is the slump.
this is a good shape. concrete sags but stays together
empty cone
straightedge
this is bad concrete, far to wet. we call anything over 120 a total slump and it should not be used.
empty cone

Experiment No:2 COMPACTION FACTOR TEST

Aim: To measure the workability of concrete by compaction factor test **Apparatus required:** Compaction factor test apparatus **Procedure**

1. The sample of concrete to be tested is placed in the upper hopper up to the brim. The trap-door is opened so that the concrete falls into the lower hopper.

2. Then the trap-door of the lower hopper is opened and the concrete is allowed to fall in to the cylinder. In the case of a dry-mix, it is likely that the concrete may not fall on opening the trap-door

3. In such a case, a slight poking by a rod may be required to set the concrete in motion. The excess concrete remaining above the top level of the cylinder is then cut off with the help of plane blades.

4. The outside of the cylinder is wiped clean. The concrete is filled up exactly up to the top level of the cylinder.

5. It is weighed to the nearest 10 grams. This weight is known as " weight of partially compacted concrete"

6. The cylinder is emptied and then refilled with the concrete from the same sample in layers approximately 5cm deep. The layers are heavily rammed or preferably vibrated so as to obtain full compaction. The top surface of the fully compacted concrete is then carefully struck off level with the top of the cylinder and weighed to the nearest 10 gm. This weight is known as " weight of fully compacted concrete"

Weight of partially compacted concrete The compaction factor = ---------- Weight of fully compacted concrete Result: The compaction factor of the given sample of concrete is_____% **Viva Voce:**

1. What is the difference between fully compacted and partially compacted concrete?
2. What is the significance of compacted concrete?
3. Define density of concrete & how it affects the strength of concrete?

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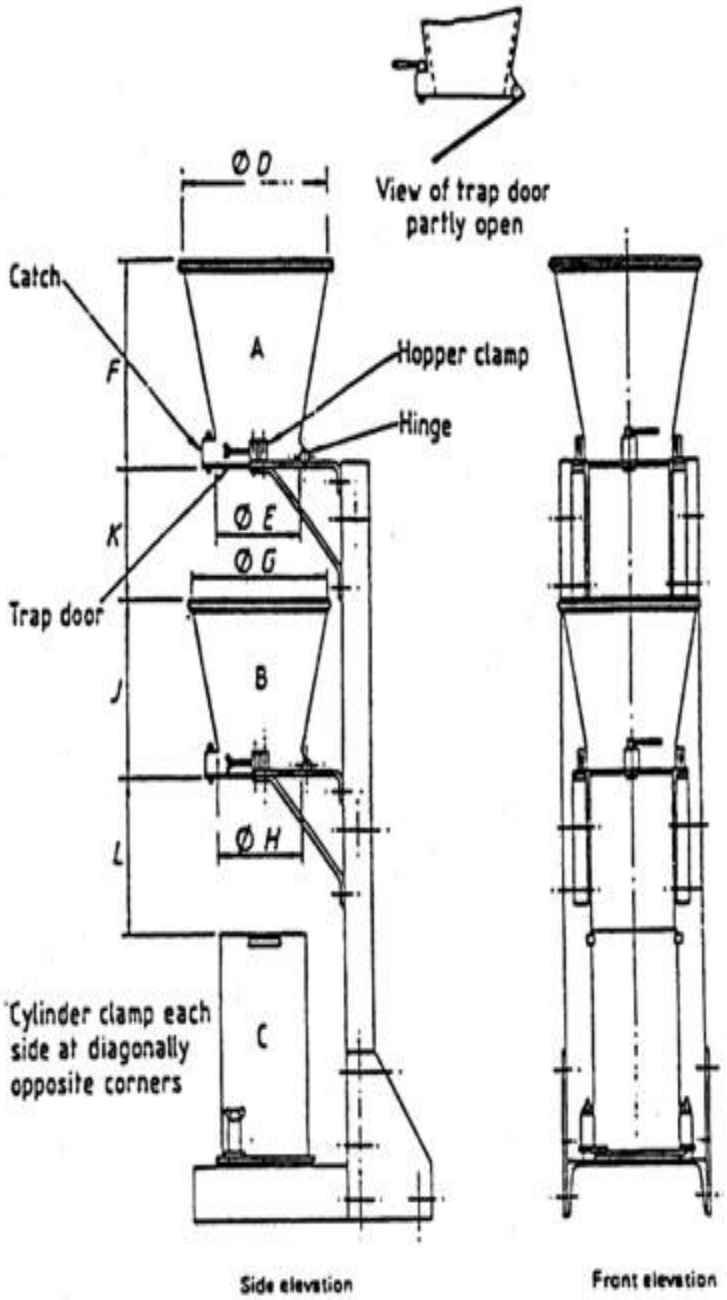
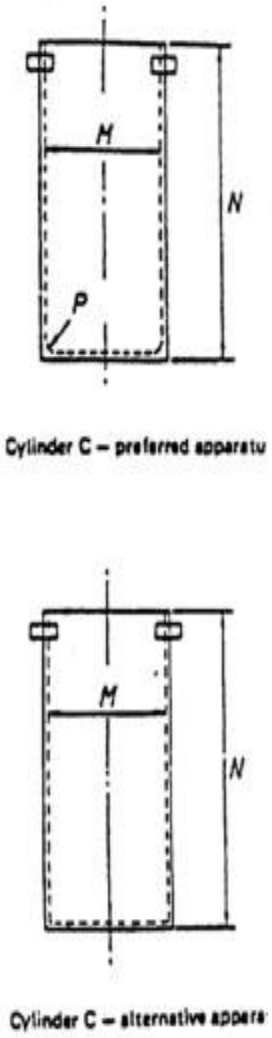
Observation and Calculation:

Mass of cylinder W1:

Sl. no	Water Cement ratio	Mass with partially compacted concrete (W2)	Mass with fully compacted concrete (W3)	Mass with Partially compacted concrete (W2 – W1)	Mass with fully compacted concrete (W3 – W1)	C.F= (W2-W1)/ (W3-W1)
1						
2						
3						


View of trap door partly open
ØD
Catch
F
A
Hopper clamp
Hinge
K
ØE
ØG
Trap door
B
J
ØH
L
Cylinder clamp each side at diagonally opposite corners
C
Side elevation
Front elevation


M
N
P
Cylinder C – preferred apparatu
M
N
Cylinder C – alternative appara

Experiment Nop:3 VEE-BEE CONSISTOMETERT

Aim: To measure the workability of concrete by vee-bee consistometer test **Apparatus required**: Vee-Bee consistometer test apparatus **Procedure.**

1) Placing the slump cone inside the sheet metal cylindrical pot of the consistometer.

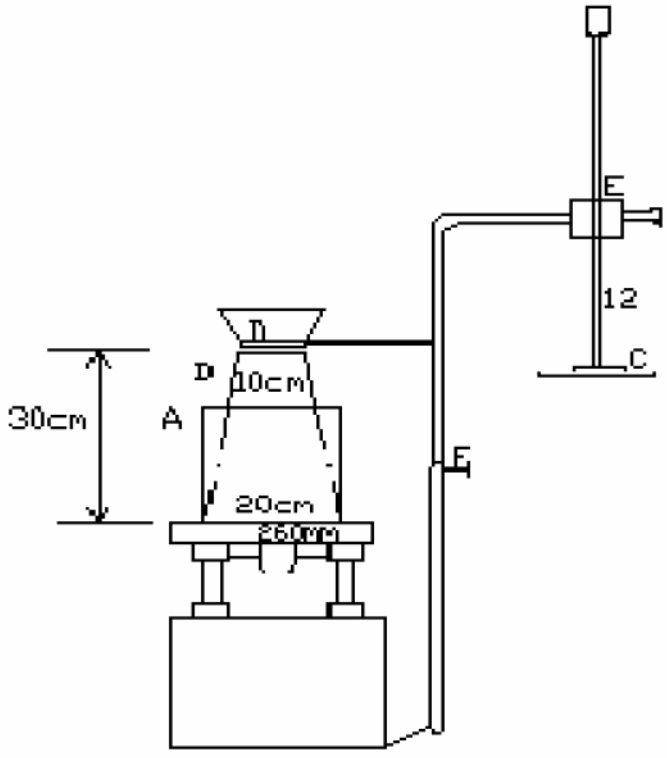
2) The glass disc attached to the swivel arm is turned and placed on the top of the concrete pot

3) The electrical vibrator is switched on and simultaneously a stop watch is started.

4) The vibration is continued till such a time as the conical shape of the concrete disappears and the concrete assumes cylindrical shape.

5) Immediately when the concrete fully assumes a cylindrical shape, the stop watch is switched off. The time required for the the shape of concrete to change from slump cone shape to cylindrical shape in seconds is known as vee bee degree.

Observation and Calculation: Initial reading on the graduated rod, a
Final reading on the graduated rod, b
Slump (b) – (a), mm
Time for complete remoulding, seconds



A= cylindrical pot

B= sheet metal cone

C= glass disc

D= swivel arm

E=glass disc adjustable screw F= adjustable screw

Experiment No:4 FLEXTURE TEST ON HARDENED CONCRETE

Aim: To determine the strength of the concrete by using flexure test **Apparatus required**: Prism mould, compression testing machine.

Procedure.

1. Test specimens are stored in water at a temperature of 24^{o}C to 30^{o}C for 48 hours before testing. They are tested immediately on removal from the water whilst they are still wet condition.

2. The dimension of each specimen should be noted before testing.

3. The bearing surface of the supporting and loading rollers is wiped and clean, and any loose sand or other material removed from the surfaces of the specimen where they are to make contact with the rollers.

4. The specimen is then placed in the machine in such manner that the load is applied to the upper most surface as cast in the mould

5. The axis of specimen is carefully aligned with the axis of the loading device. No packing is used between the bearing surfaces of the specimen and rollers.

6. The load is applied without shock and increasing continuously at a rate of the specimen. The rate of loading is 4kN/min for the 15cm specimen and 18 kN /min for the 10cm specimen.

7. The load is increased until the specimen fails and the maximum load applied to the specimen during the test is recorded

Result: The strength of concrete is _____N/mm2 **Viva Voce:**

1. What is the bending equation?
2. What is the bending stress for „T section?
3. What is the significance of moment of inertia with respect to bending stress?
4. How does the centroid affects the bending stress for different shapes of beams?

Experiment No:5 WATER ABSORPTION TEST ON COARSE AGGREGATE

Aim: To determine the water absorption of given coarse aggregate **Apparatus required**: Container, Balance, Electric Oven

Procedure.

1) The coarse aggregate passing through IS 10mm sieve is taken about 200g.
2) They are dried in an oven at a temperature of $110_o \pm 5_oC$ for 24 hours.
3) The coarse aggregate is cooled to room temperature.
4) Its weight is taken as (W_1g)
5) The dried coarse aggregate is immersed in clean water at a temperature $27_o \pm 2_oC$ for 24 hours.
6) The coarse aggregate is removed from water and wiped out of traces of water with a cloth
7) Within three miniutes from the removal of water, the weight of coarse aggregate W_2 is found out
8) The above procedure is repeated for various samples.

Sample No.	Weight of oven dried specimen (W_1) g	Weight of saturated specimen (W_2) g	Weight of water absorbed $W_3=(W_2-W_1)$ g	% of water absorption $=(W_3/W_1) \times 100$

Weight of dry sample of coarse aggregate W_1 = Weight of saturated specimen W_2 = Weight of water absorbed $W = W_2 – W_1$ = Percentage of water absorption $(W_2 – W_1)$ ---------- x 100 = W_1

Result: Water absorption of the coarse aggregate is _____ **Viva voce:** 1. How does the Water absorption of the coarse aggregate affects the mix design of concrete?