# CVL3211 : Quiz 2 Solution

**Q.1**

a Volume of cube for compressive strength test of concrete = $15 \times 15 \times 15 cm^3 = 3375 cm^3$.
Air content of concrete mix = 3%
Volume of concrete minus air in test cube =
$3375 - (3375 \times 3)/100 cm^3 = 3273.75 cm^3$

b Let us assume weight of cement be $x$, for M15 (1:2:4)

| | **Cement** | **Sand** | **Coarse aggregates** |
|---|---|---|---|
| **Weight (Kg)** | $x$ | $2x$ | $4x$ |
| **Density (gm/cc)** | 3 | 2.5 | 2.6 |
| **Volume ($m^3 \times 10^{-3}$)** | $x/3$ | $2x/2.5$ | $4x/2.6$ |

Volume of water = $0.5x$ Volume balance equation,
$V_c + V_w + V_s + V_a = 3273.75 cm^3$
$(x/3 + 0.5x + 2x/2.5 + 4x/2.6) m^3 = 3273.75 cm^3 \times 10^3$

c From above equation we get
x = weight of cement = $1.0321 Kg$
weight of sand = $2.0643 Kg$
weight of coarse aggregates = $4.128 Kg$
weight of water = $0.516 Kg$

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Q.2

a. Cube compression failing load $= 675KN$
Area of compression cube under stress $= 15 \times 15cm^2$
Assuming a single test, compressive strength $=$ Load/Area $=$ $675KN/225cm^2 = 30MPa$

b. If another concrete cube fails at $450KN$ hence assuming it contained lesser cementing material or more voids. In any case weaker cube will contain lesser cement so lesser curing time will be needed. Opposite is true for stronger cube.

c. Another cube tested at $495KN$. Assuming the group as population, average load is $(675 + 450 + 495)/3 = 540KN$
Standard deviation $=$
$\sqrt{((540 - 675)^2 + (540 - 450)^2 + (540 - 495)^2)/3} =$
$97.21KN$
Dividing both by areas, $\mu = 540KN/225cm^2 = 24MPa$
$\sigma = 97.21KN/225cm^2 = 4.32MPa$

If someone assumes group of readings as sample so this assumption should be stated otherwise no marks will be awarded.