

Department of Civil Engineering, IIT Delhi  
CVL141 – Civil Engineering Materials  
Minor 2 – Semester I – 2019-2020

9

Answer in the space below. No extra sheets will be given. No rough work on this sheet. No exchange of calculators, pens, pencils, erasers, etc.

**Question 1 (10 marks):** Indicate with reasons whether the following statements are true or false (No marks without correct reasons. Give concise 1 line reasons and answer in the correct order. The second line of the reason will not be read.):

a) Water reducing admixtures reduce the rate of slump loss in concrete.

False, It reduce the water and when its effect end there is no enough water in concrete.

b) Chloride based accelerators should not be used to achieve faster strength development.

True, it increase only early age strength.

c) Air-entraining admixtures reduce the durability of concrete.

False, it provide the air bubble to water to expand and avoid the crack due to expansion in solid.

d) Addition of fly ash can reduce the strength of concrete.

True, its spherical particles increase the amount of water cause increase w/c ratio. it also reduce heat of hydration.

e) Silica fume can be used to reduce the heat of hydration of concrete.

False, it increase the surface area cause of fineness so increase heat of hydration.

f) Inert fillers do not influence the hydration of clinker phases.

False, inert fillers (limestone) react with CH (calcium hydroxide) little bit.

g) Curing increases the strength of concrete.

True, It prevent the water evaporation from the surface.

h) Fresh concrete behaves like a Newtonian fluid.

False, Concrete is changing with time, it is mix of all fluids.

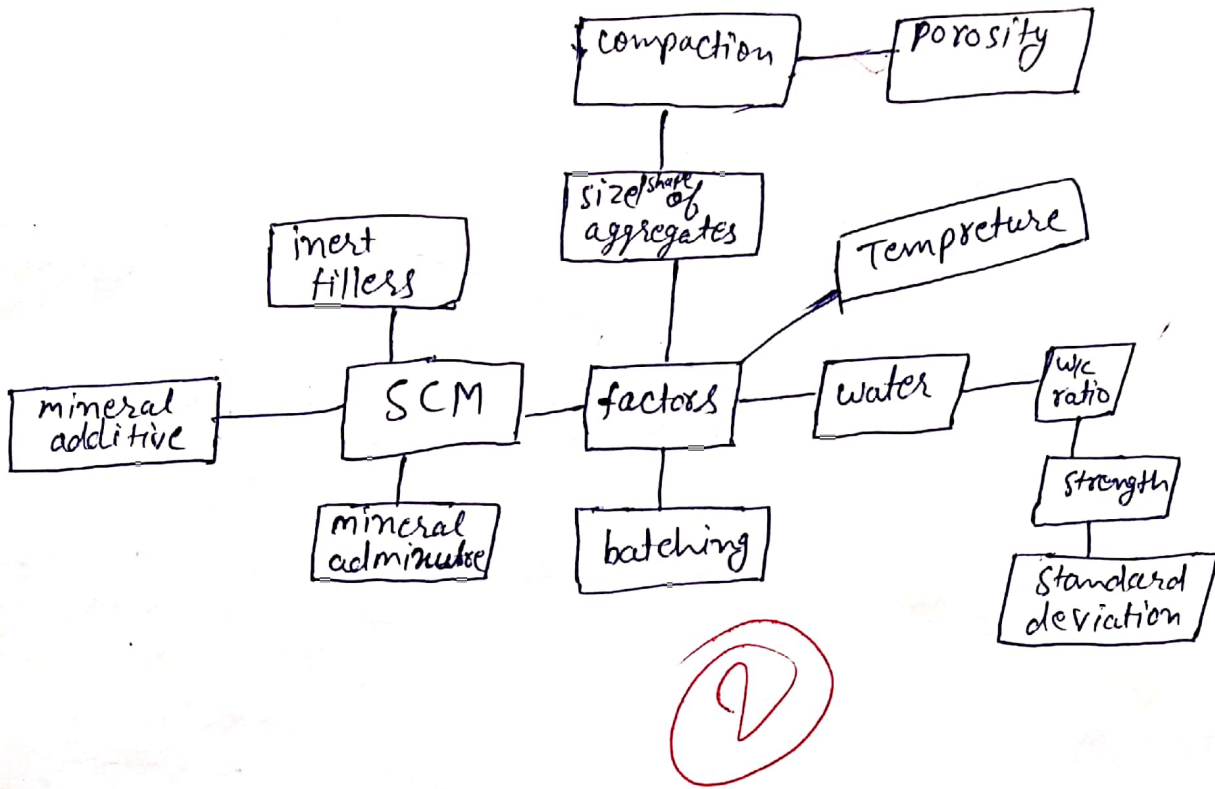
i) Finishing of the surface should be carried out after bleeding is finished.

True, Due to bleeding we can get un-even surface after finishing.

j) The standard deviation in strength should be considered to be as high as possible.

False, Due to higher standard deviation strength will not be more predictable.

**Question 2 (5 marks):** Draw a diagram (flow-chart or relationship diagram) of various factors that affect the quality of concrete. (Only the diagram will be graded.)



②

**Question 3 (5 marks):** The trial of a mix design below was carried out (for 1 m<sup>3</sup> of concrete) as given in the table below. Modify the mix design using:

Case A: Using only a water reducer with 10% water reduction (0.5% by weight of cement)

Case B: Using a fly ash with 20% cement replacement at 1:1 weight to weight replacement

Case C: Using both A & B

(You can ignore the water content in the admixture. Keep the w/c and c/a fixed)

	Specific gravity	Base Mix - Weight (per m <sup>3</sup> of concrete)	Case A	Case B	Case C
Water	1	180.0 kg	162 kg	180 kg	162 kg
Cement	3.15	400.0 kg	370.9 kg	320 kg	320 kg
Fly ash	2.10	0.0 kg	-	80 kg	80 kg
Admixture	-	0.0 kg	2 kg	-	2 kg
Fine agg.	2.65	697.9 kg	697.9 kg	697.9 kg	697.9 kg
Coarse agg.	2.65	1138.6 kg			

w/c = 0.41

c/a = 0.901