e) Sieve analysis :-

i) Coarse Aggr. = Passing from 20mm IS Sie

(ii) fine Aggr. = Zone II from IS:383 table-4.

Target Strength :-

$$f'_{ck} = f_{ck} + 1.65\,s$$
$$= 25 + 1.65 \times 4$$
$$= 31.6 \text{ N/mm}^2$$

Selection of w/c ratio :-

From table 5 of IS: 456-2000,

Max w/c ratio = 0.5

From the trial mixes, w/c ratio adopt = 0.4

0.45 < 0.5 . OK.

Selection of water Content :-

From, table-2, IS 10262 - 2009

Max water content for 20mm aggr. (25+50mm slump)

$= 186$ lit.

For 100mm slump $= 186 + \frac{3+3}{100} \times 186$

$= 197$ lit.

Calculation of Cement Content :-

W/c ratio = 0.45

Water Content = 197 lit

∴ Cement Content = 197/0.45 = 437.78 kg/m³

Min. Cement Content = 320 kg/m³ for Severe Condition.

∴ 437.78 kg/m³ > 320 kg/m³

OK.

Proportion of Vol. of C.A. & F.A. :-

From table 3 of IS 10262 - 2009. vol. of C.A. 20 mm size C.A. & F.A. (Zone - II) from W/c ratio 0.5 = 0.62

Here the W/c ratio = 0.45

∴ Vol. of C.A. for water cement ratio 0.45

= 0.62 + 0.01

= 0.63

[At the rate of +/- 0.01 for every change in W/c ratio +/- 0.05.]

Vol. of F.A. = 1 - 0.63 = 0.37

Mix Calculation :-

a) Vol. of Concrete = $1\ m^3$

b) Vol. of Cement = $\frac{437.78}{3.15} \times \frac{1}{1000} = 0.1389\ m^3$

c) Vol. of water = $\frac{197}{1} \times \frac{1}{1000} = 0.197\ m^3$

d) Vol. of all in aggr. = $1 - (0.1389 + 0.197)$
$= 0.6641\ m^3$

e) Mass of C.A. = $0.6641 \times 0.63 \times 2.74 \times 1000$
$= 1146\ kg.$

f) Mass of F.A. = $0.6641 \times 0.37 \times 2.7 \times 1000$
$= 663\ kg.$

Mix Proportion :-

Cement = $437.78\ kg/m^3$

water = $197\ kg/m^3$

C.A. = $1146\ kg/m^3$

F.A. = $663\ kg/m^3$

W/c ratio = 0.45.

Cube NO- Mix

	without Fibre	with fibre (5% saw fibre & admixture 0.4%
7days	3	3
14 days	3	3
28 days	3	3

Total NO. of Cube required = 18 NOS.

Each dimensions = 0.15 m x 0.15 m x 0.15 m

= 150 mm x 150mm x 150 mm

∴ Total Vol. $= (0.15)^3 \times 18 = 0.06075\ m^3$

Required Cement = 27 kg

C.A = 78 kg

F.A = 40.3 kg

water = 12 kg

Coconut-fibre = 1.35 kg (5% of Cement)

Materials for FRC (raw) Cubes:-

OPC = 27 kg

Coarse aggregates (20mm size) = 70 kg

Fine aggregate s = 40.3 kg

Normal fresh water = 12 kg

Coconut Raw fibre = 1.35 kg

Admixture = BASF Rheobuild 918 or any Superplasticizer Admixture.

As per IS: 383 - 1970

Nominal Size Coarse aggr. max 20 mm.

Entrained air as percent of vol. of Concrete is 2%

$V = 1 - 0.02 = 0.98\ m^3 = 980$ lit.

Volume of Cement $= \frac{437.78}{3.15} \times \frac{1}{1000}$

$= 0.1389\ m^3$

Vol. of water $= \frac{197}{1} \times \frac{1}{1000} = 0.197\ m^3$

Vol. of all in aggregate $= 0.98 - (0.139 + 0.197)$

$= 0.644\ m^3$

Mass of C.A. $= 0.644 * 0.63 \times 2.74$ kg.

$= 1111.67$ kg

Mass of F.A. $= 0.644 \times 0.37 \times 2.7 \times 1000$

$= 643.36$ kg.

Cement $= 437.78$ kg/m^3

F A $= 643.36$ kg/m^3

C A $= 1111.67$ kg/m^3

Water $= 197$ kg/m^3

Water Cement Ratio $= 0.45$

Cube $= 0.15$ M^3

Nominal mix = 7 days – 3 cube
28 days – 3 cube } 6 cube

Cement $= 8.865$ kg

F A $= 13.028$ kg

C A $= 22.511$ kg

Water $= 3.98$ kg

Adding 2% plastic aggregate replacing by C.A

plastic = for 6 cube $= 0.176$ kg. (20mm)

C A $= 22.511 - 0.176 = 22.335$ kg.

remaining materials are same.