# Manual design of beams :

### Beam no : 7

* + Length of beam(L) = 3500 mm
  + Width (b) = 230 mm
  + Overall Depth (D) = 300 mm
  + Cover (d|) = 25 mm
  + Effective depth (d) = 270 mm
  + fck = 30 mpa
  + fy = 500 mpa
  + Mu = 19.21 Kn/m (obtained from STAAD.Pro)

**Check for depth :**

Mulimit = 0.133 \* fck \* b \* d2

19.21 \* 106 = 0.133 \* 30 \* 230 \* d2

On solving the above eq we get depth (d) = 145mm

Depth d (asuumed) > minimum depth

Hence effective depth d = 270 mm is Satisfied.

Mulimit = 0.133 \* fck \* b \* d \* d = 66.90 KN/m

Since mu < mulimit it is singly reinforced.

From Is 456 : Clause 38.1

Mu = 0.87 \* fy \* Ast \* d \*(1-Ast\*fy/b d fck)

From above eq area of steel obtained as : 177.42 sq.m

For the same beam area of steel from STAAD pro is : 172.95 sq.m In the same way other beams are also designed.

### Beam no : 6

* + Length of beam(L) = 3500 mm
  + Width (b) = 230 mm
  + Overall Depth (D) = 300 mm
  + Cover (d|) = 25 mm
  + Effective depth (d) = 270 mm
  + fck = 30 mpa
  + fy = 500 mpa
  + Dead load = 25 \* 0.3 \* 0.23 = 1.725 Kn/m
  + Live load = 5 Kn/m2
  + Floor load = 1 Kn/m2
  + Wu  = 1.5(1.725 + 5 + 1) = 11.58 Kn/m
  + Mu  = 11.58 \* 3.52/8 = 17.74 Kn-m

**Check for depth :**

Mulimit = 0.133 \* fck \* b \* d2

17.74 \* 106 = 0.133 \* 30 \* 230 \* d2

On solving the above eq we get depth (d) = 140mm

Depth d (asuumed) > minimum depth

Hence effective depth d = 270 mm is Satisfied.

Mulimit  = 0.133 \* fck \* b \* d2

Mulim = 66.90 Kn-m

Since mu < mulimit it is singly reinforced.

From Is 456 : Clause 38.1

Mu = 0.87 \* fy \* Ast \* d \*(1-Ast\*fy/b d fck)

From above eq area of steel obtained as : 157.74 sq.m

For the same beam area of steel from STAAD pro is : 166.07 sq.m