ASSIGNMENT ON CHAPTER ONE

Assignment Title: Moment curvature

Due Date: One Week

Although it is not needed explicitly in ordinary design, the relation between moment applied to a given beam section and the resulting curvature, through the full range of loading to failure, is important to the study of:

- Member ductility,
- Understanding the development of plastic hinges, and
- Accounting for the redistribution of elastic moments that occur in most RC structures before collapse.

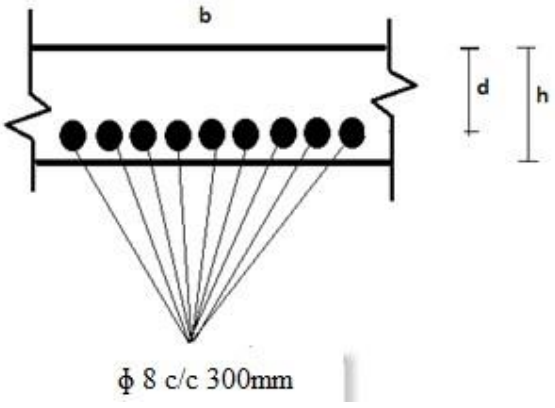
The ductility of a beam cross section depends on:

- Material grade (both for steel and concrete)
- Member dimension
- Reinforcement detail

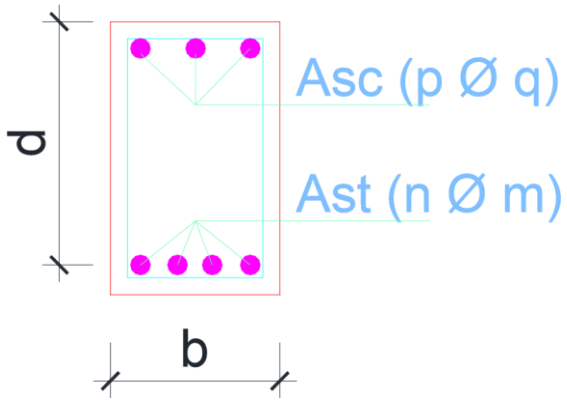
Thus, the aim of this assignment is to help students understand the contribution of the above mentioned variables to the ductility of a beam cross section.

I. Ductility of slab

The following slab element shown below has a width b=1000mm, a height of h=180mm and an effective depth d=161mm.if the slab is made C25/30 and steel S-400, plot the moment curvature diagram for the slab at least four points.



II. Consider a beam section shown in the figure below:



Where:

- b is the beam width in mm
- d is the effective depth in mm
- f_{yk} is the characteristics strength of the rebar in MPa
- f_{cu} is the characteristics cubic compressive strength of the concrete in MPa
- A_{st} area of steel in the tension side
- A_{sc} area of steel in the compression side
- n is number of bars in the tension side
- m is size of bar in tension side
- p is number of bars in the compression side
- q is size of bar in the compression side

Use (γ_c =1.5 , γ_s= 1.15 and concrete cover 25mm)

REQUIRED: Draw the moment curvature diagram for the different sections given below and briefly discuss the contribution of each variable.

I. To find the effect of A_{st} on the ductility of beam [Group#1]

b (mm)	300
d (mm)	400
f_{yk} (MPa)	400
f_{cu} (MPa)	30
A_{st}	2ϕ12,4ϕ14,4ϕ20,4ϕ24,6ϕ20,5ϕ24
A_{sc}	none

II. To Find the effect of A_{sc} on the ductility of beam [Group#2]

b (mm)	300
d (mm)	400
f_{yk} (MPa)	400
f_{cu} (MPa)	30
A_{st}	5ϕ24
A_{sc}	2ϕ10,2ϕ12,2ϕ14,2ϕ16,2ϕ20,2ϕ24

III. To find The effect of f_{cu} on the ductility of the beam [Group#3]

b (mm)	300
d (mm)	400
f_{yk} (MPa)	400
f_{cu} (MPa)	20,25,30,37,45,50
A_{st}	5ϕ24
A_{sc}	none

IV. To find The effect of f_{yk} on the ductility of the beam [Group#4]

b (mm)	300
d (mm)	400
f_{yk} (MPa)	400,450,460,500,550,600
f_{cu} (MPa)	30
A_{st}	4ϕ14
A_{sc}	none

V. To find The effect of d on the ductility of the beam [Group#5]

b (mm)	300
d (mm)	350,400,450,500,550,600
f_{yk} (MPa)	400
f_{cu} (MPa)	30
A_{st}	5ϕ24
A_{sc}	none

VI. To find The effect of b on the ductility of the beam [Group#6]

b (mm)	400,450,500,550,600,800
d (mm)	300
f_{yk} (MPa)	400
f_{cu} (MPa)	30
A_{st}	5ϕ24
A_{sc}	none