



مادة الخرسانة المسلحة  
الحل النموذجي لإمتحان الفصل  
الدراسي الثاني  
٢٠١٧/٠٦/٠٨

الفرقة الثانية- قسم مساحة  
٢٠١٧-٢٠١٦

دكتور المادة  
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**Model Answer**

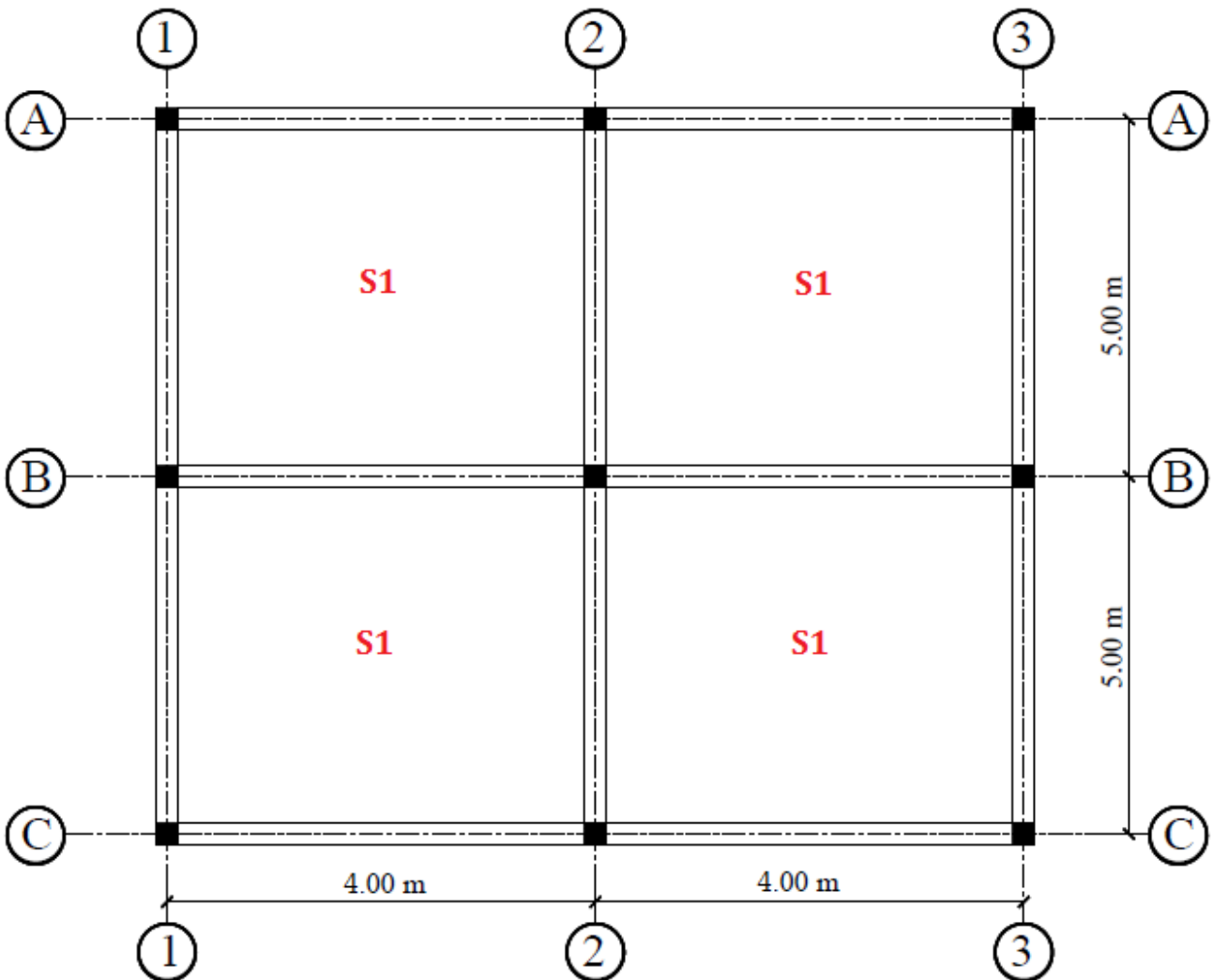
(1) **QUESTION 1:** (60 Marks)

[ILO's: a3, a4, a5, a6, b2, b4, b6]

a) Design all slabs for thickness and steel reinforcement.

**(20 Marks)**

All slabs (S1) are two way having the same design.



## Design Of Solid Slab

### Given:

$f_y =$	360	Mpa	$F.c =$	1.5	$\text{KN/m}^2$
$f_{cu} =$	25	MPa	L.L =	2	$\text{KN/m}^2$
Long Dir. =	5	m	Short Dir. =	4	m
cover =	15	mm			
Slab Contin.(Long Dir.)	Continuous From (1)end			Factor:	0.87
Slab Contin.(Short Dir.)	Continuous From (1)end			Factor:	0.87

$r =$	1.25		<b>Two Way Slab</b>	
$\alpha =$	0.475			
$\beta =$	0.224			
Assume $t_s =$	100	mm	Take $t_s =$	<span style="border: 1px solid black; padding: 2px;">100</span> mm
D.L =	4	$\text{KN/m}^2$		
L.L =	2	$\text{KN/m}^2$		$W_u = 1.5(D.L + L.L)$
$W_u =$	9	$\text{KN/m}^2$		

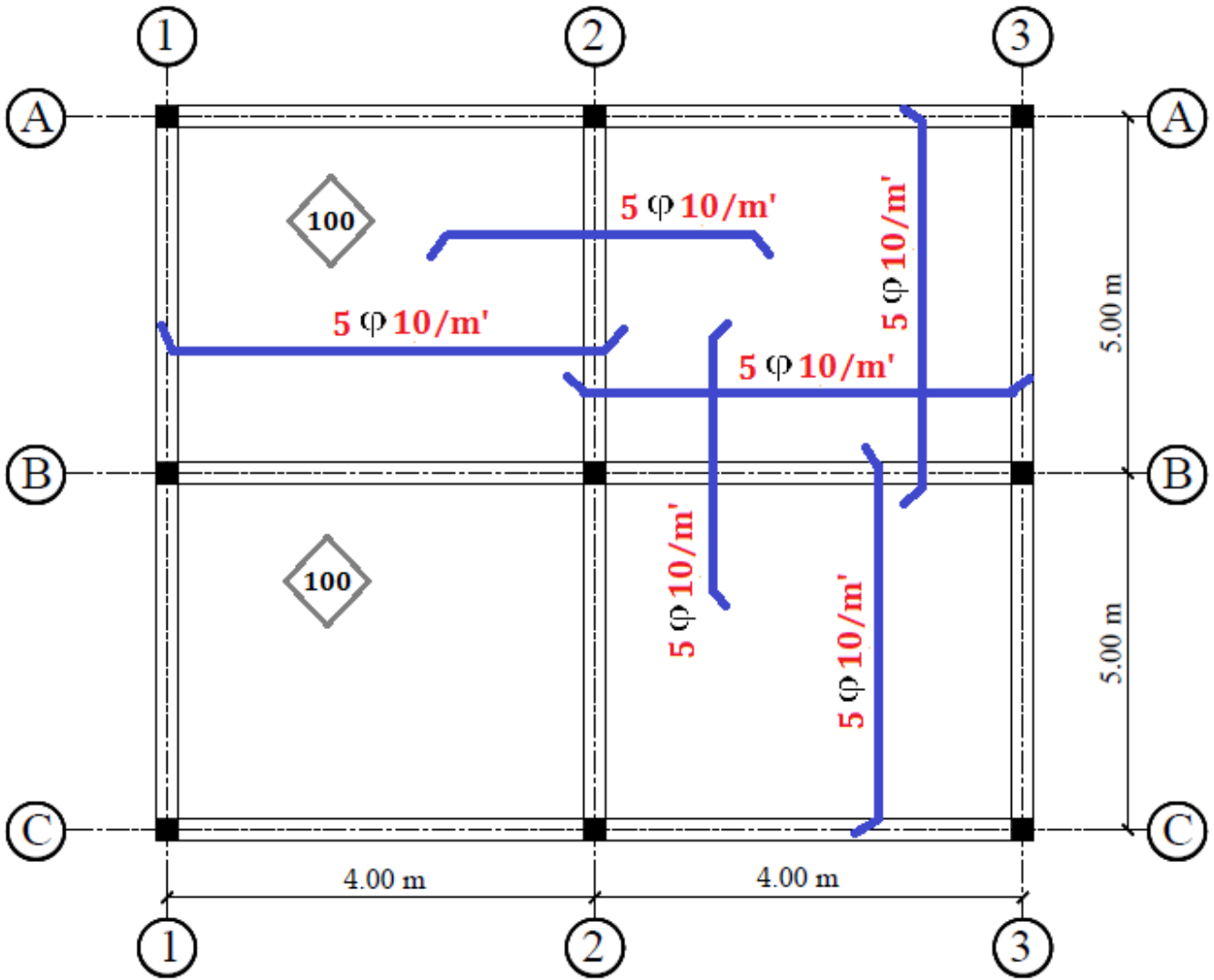
### Short Direction:

$M =$	6.84	KN.m		
$R =$	0.946713			
$\mu =$	0.003181			
$A_s =$	270.4014	$\text{mm}^2$	5 $\Phi$ 10 /m`	

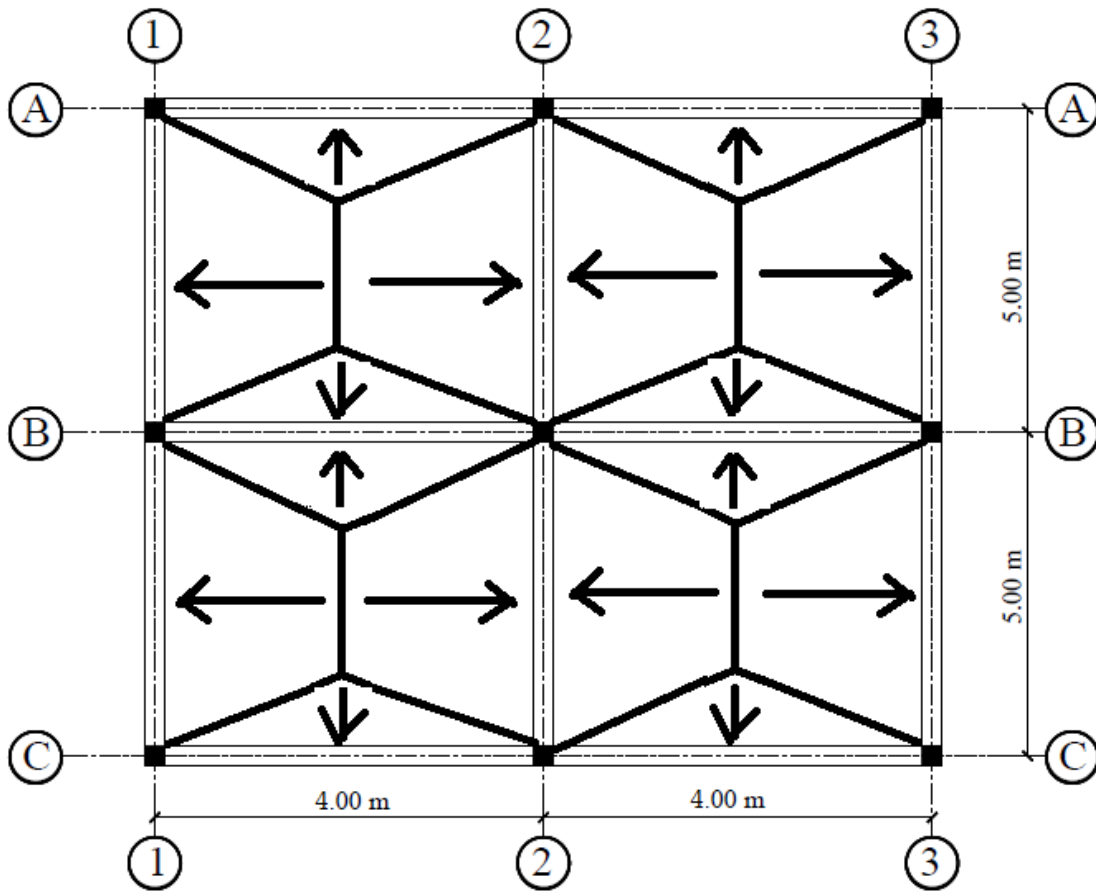
### Long Direction:

$M =$	5.04	KN.m		
$R =$	0.896			
$\mu =$	0.003003			
$A_s =$	225.2199	$\text{mm}^2$	5 $\Phi$ 10 /m`	

b) Draw to a reasonable scale a plan showing reinforcement details and thickness of slabs. **(20 Marks)**



c) Calculate the load distribution and draw **B.M.D** & **S.F.D** for beams on axis (B-B) & (3-3). **(20 Marks)**



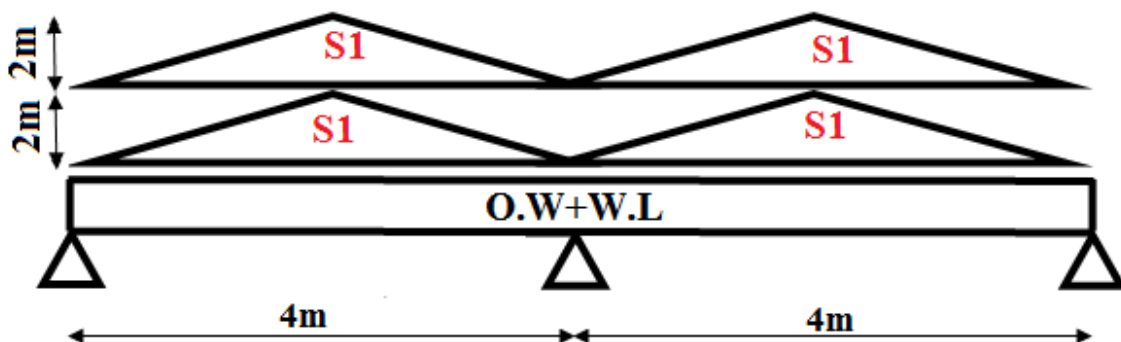
**Slab type according to type of beams:**

**S1:**  $S=5/4=1.25 < 2$  two way distribution

For  $\triangle$  :  
 $\alpha=0.667$  &  $\beta=0.5$

For  $\nabla$  :  
 $\alpha=0.787$  &  $\beta=0.6$

**For Beam B-B:**



Beam section  $b \times t = 250 \times 600$

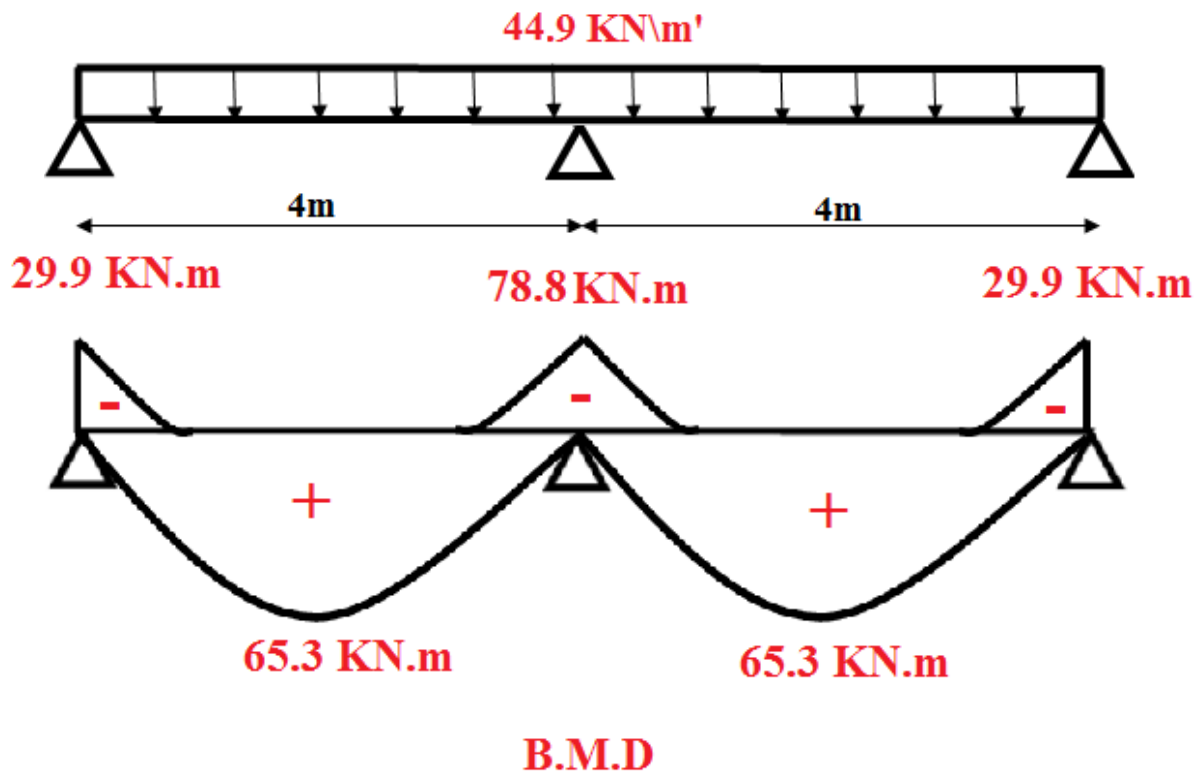
O.W =  $3.125 \text{ KN/m}$

W.L =  $10.8 \text{ KN/m}$

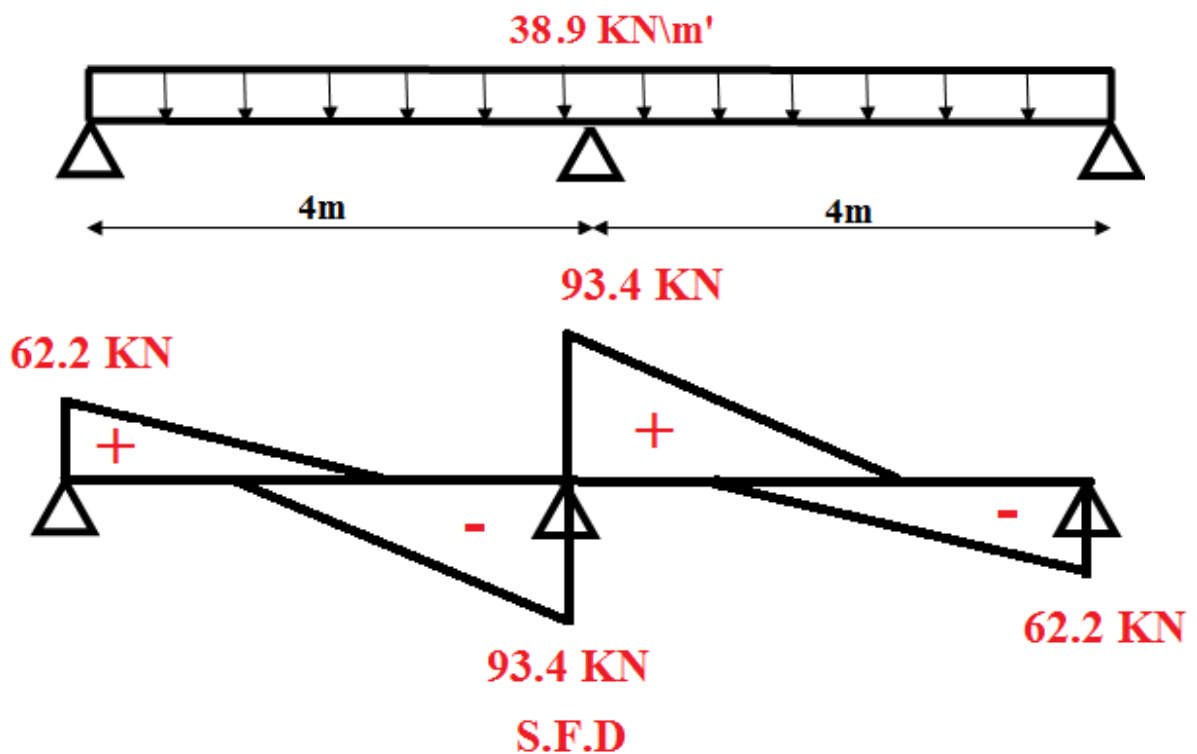
$W_{u \text{ bend.}} = 44.9 \text{ KN/m}$

$W_{u \text{ shear}} = 38.9 \text{ KN/m}$

For Bending:



For Shear:



**For Beam 3-3:**

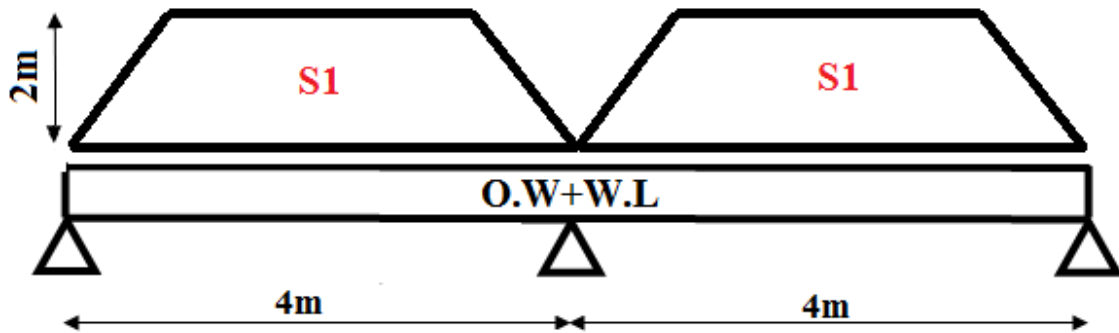
Beam section  $b \times t = 250 \times 600$

$O.W = 3.125 \text{ KN/m}$

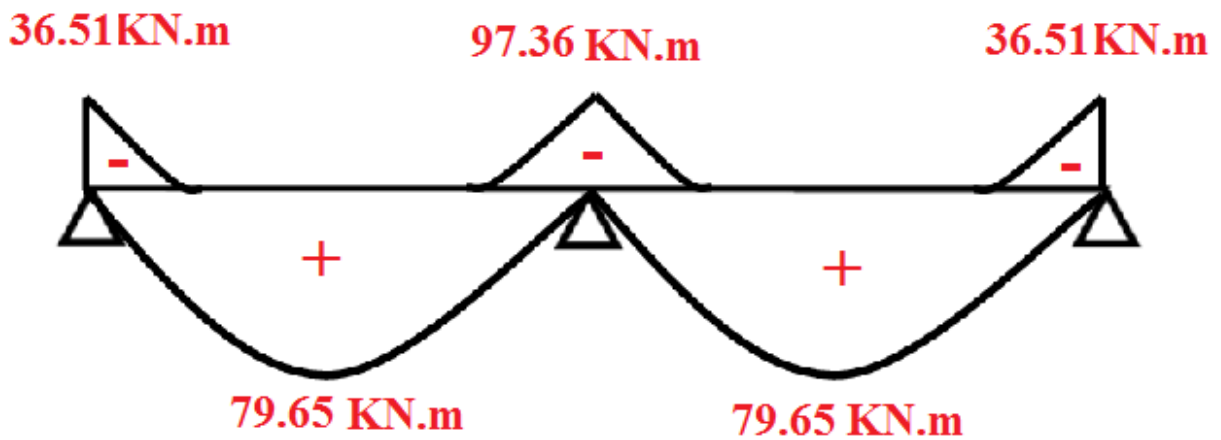
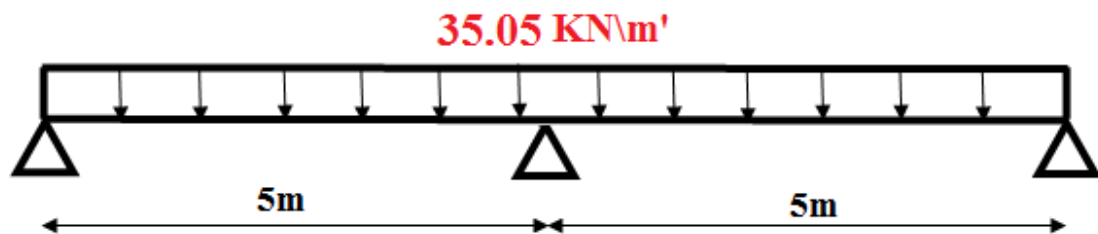
$W.L = 10.8 \text{ KN/m}$

$W_{u \text{ bend.}} = 44.9 \text{ KN/m}$

$W_{u \text{ shear}} = 38.9 \text{ KN/m}$



**For Bending:**



**B.M.D**

For Shear:

