Department: Civil Engineering

Level: Three

Semester: Summer – 2017/2018

Subject: Structural Analysis (II)

Subject Code: CIE204

Date: July-2018

Time allowed: 90 Min.

Full marks: 20

No. of pages: one

- *Answer the following questions. Diagrams should be neat and to scale.*

Question No. (1) – 13 marks

Draw the distribution of normal stresses over the given section in Fig.1 due to the given loads (P_1=150t compression, P_2= 100t tension & P_3= 200t compression). Find also the extreme values of normal stresses.
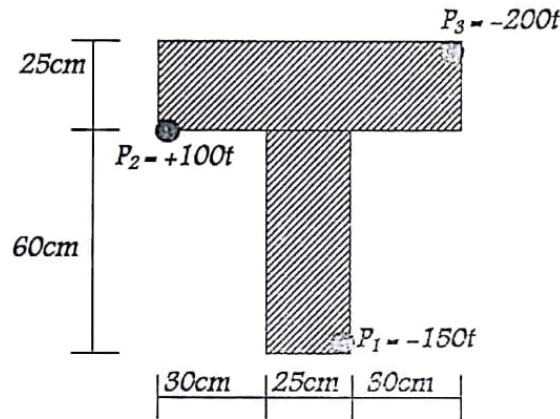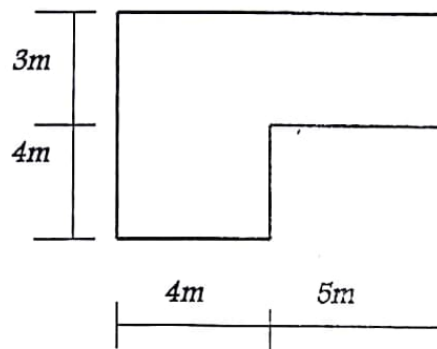

Fig.1

Question No. (2) – 7 marks

For the shown section illustrated in Fig.2, find the location of centroid then calculate the moments of inertia and the product moment of inertia about two orthogonal axes X & Y pass through the centroid. Determine the locations of principal axes and the principal moments of inertia..

Fig.2

Best wishes

Dr. Rafeek W. Salib

Question No. (1) – 13 marks

Draw the distribution of normal stresses over the given section in Fig.1 due to the given loads (P_1=150t compression, P_2= 100t tension & P_3= 200t compression). Find also the extreme values of normal stresses.
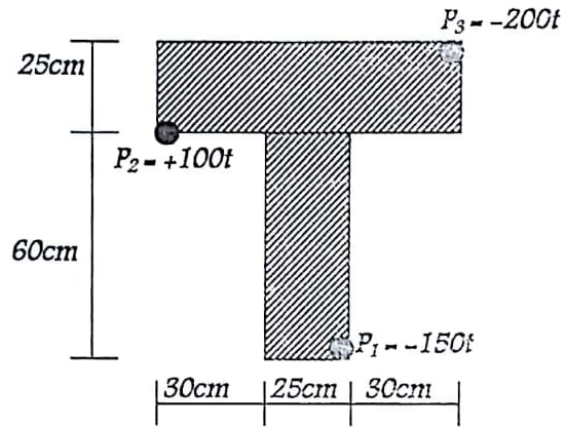
$P_3 = -200t$

25cm

$P_2 = +100t$

60cm

$P_1 = -150t$

|30cm | 25cm | 30cm |

Fig.1

Properties
Y'= 54.91cm
Ix=2148931.45cm^4
Iy=1357552.1cm^4

Straining actions
N = -250t
Mx= 2727.5cmt
My= -14652cmt
\

N

0.43t/cm^2

+

A

−

0.52 t/cm^2

Question No. (2) – 7 marks

For the shown section illustrated in Fig.2, find the location of centroid then calculate the moments of inertia and the product moment of inertia about two orthogonal axes X & Y pass through the centroid. Determine the locations of principal axes and the principal moments of inertia..

Fig.2

Properties
Properties
X'= 3.57m
Y'= 4.2cm
Ix=164.65m⁴
Iy=266.37m⁴
Ixy=87.91m⁴

Tan2θ=1.73, θ1=29.97°, θ2=119.97°
Iu=317.06cm⁴
Iv=113.96 cm⁴
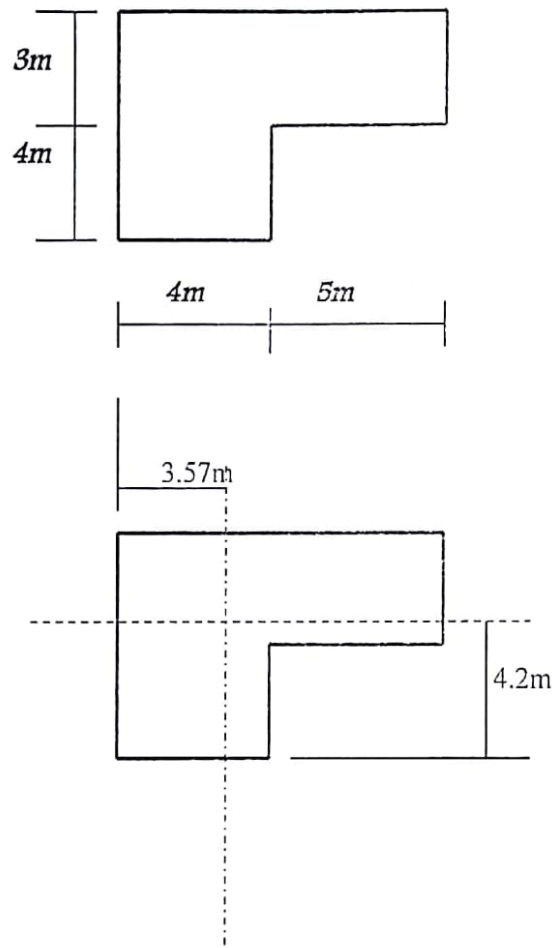
Question No. (2) – 7 marks

For the shown section illustrated in Fig.2, find the location of centroid then calculate the moments of inertia and the product moment of inertia about two orthogonal axes X & Y pass through the centroid. Determine the locations of principal axes and the principal moments of inertia..

Fig.2

Properties
Properties
$X'= 3.57m$
$Y'= 4.2cm$
$I_x=164.65m^4$
$I_y=266.37m^4$
$I_{xy}=87.91m^4$

$Tan2\theta=1.73$, $\theta_1=29.97°$, $\theta_2=119.97°$
$I_u=317.06cm^4$
$I_v=113.96 cm^4$