

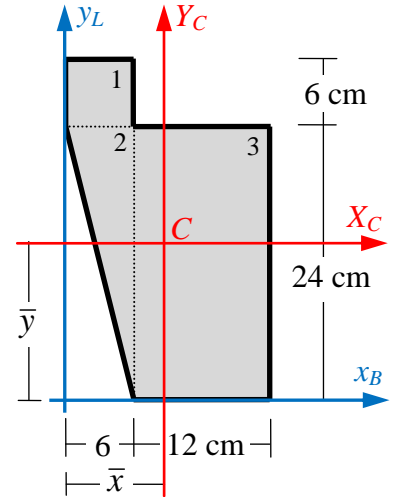
Name:

Code:

Quiz: (10 Marks)

Choose the nearest answer.

- The first moments of areas 1, 2 and 3 about the x_B -axis are:
(A) 972 cm³ (B) 972 cm³ (C) 36 cm³ (D) 972 cm² (E) 108 cm³
1152 cm³ 5211 cm³ 72 cm³ 1152 cm² 288 cm³
3456 cm³ 6543 cm³ 288 cm³ 3456 cm² 3456 cm³
- The first moments of areas 1, 2 and 3 about the y_L -axis are:
(A) 108 cm³ (B) 108 cm³ (C) 36 cm³ (D) 108 cm² (E) 972 cm³
288 cm³ 882 cm³ 72 cm³ 288 cm² 1152 cm³
3456 cm³ 6543 cm³ 288 cm³ 3456 cm² 3456 cm³
- The centroid of the cross-section is at $\bar{x} = \dots$ from y_L -axis.
(A) 9.727 cm (B) 14.09 cm (C) 7.77 cm (D) 11.11 cm (E) 9.727 cm³
- The centroid of the cross-section is at $\bar{y} = \dots$ from x_B -axis.
(A) 14.09 cm (B) 9.727 cm (C) 14.09 cm² (D) 11.11 cm (E) 14.09 cm³
- The second moments of areas 1, 2 and 3 about their centroidal x_c -axes are:
(A) 108 cm⁴ (B) 108 cm⁴ (C) 36 cm⁴ (D) 108 cm⁴ (E) 108 cm³
2304 cm⁴ 4032 cm⁴ 72 cm⁴ 144 cm⁴ 2304 cm³
13824 cm⁴ 42831 cm⁴ 288 cm⁴ 3456 cm⁴ 13824 cm³
- The second moments of areas 1, 2 and 3 about the x_B -axis are:
(A) 324 cm⁴ (B) 26352 cm⁴ (C) 26244 cm³ (D) 44262 cm⁴ (E) 108 cm⁴
1152 cm⁴ 20736 cm⁴ 18432 cm³ 23481 cm⁴ 2304 cm⁴
41472 cm⁴ 55296 cm⁴ 41472 cm³ 27414 cm⁴ 13824 cm⁴
- The second moment of the cross-section about the x_B -axis is:
(A) 16236 cm⁴ (B) 102384 cm⁴ (C) 86148 cm⁴ (D) 102384 cm³ (E) 46656 cm⁴
- The second moment of the cross-section about its centroidal X_C -axis is:
(A) 102384 cm⁴ (B) 23756.73 cm⁴ (C) 86148 cm⁴ (D) 23756.73 cm³ (E) 9186.55 cm⁴
- The second moments of areas 1, 2 and 3 about their centroidal y_c -axes are:
(A) 108 cm⁴ (B) 108 cm⁴ (C) 36 cm⁴ (D) 108 cm⁴ (E) 108 cm³
441 cm⁴ 144 cm⁴ 72 cm⁴ 2304 cm⁴ 144 cm³
6543 cm⁴ 3456 cm⁴ 288 cm⁴ 13824 cm⁴ 3456 cm³
- The second moments of areas 1, 2 and 3 about the y_L -axis are:
(A) 26244 cm⁴ (B) 432 cm⁴ (C) 423 cm⁴ (D) 423 cm³ (E) 324 cm⁴
18432 cm⁴ 1296 cm⁴ 2511 cm⁴ 2511 cm³ 1152 cm⁴
41472 cm⁴ 44928 cm⁴ 27414 cm⁴ 27414 cm³ 41472 cm⁴
- The second moment of the cross-section about the y_L -axis is:
(A) 42948 cm⁴ (B) 3708 cm⁴ (C) 46656 cm⁴ (D) 46656 cm³ (E) 102384 cm⁴
- The second moment of the cross-section about its centroidal Y_C -axis is:
(A) 42948 cm⁴ (B) 46656 cm⁴ (C) 9186.55 cm⁴ (D) 9186.55 cm³ (E) 23756.73 cm⁴
- The product (mixed) moments of areas 1, 2 and 3 about their centroidal x_c and y_c -axes are:
(A) 0 (B) 36 cm⁴ (C) 0 (D) 36 cm³ (E) 288 cm⁴
0 -288 cm⁴ -288 cm⁴ -288 cm³ 72 cm⁴
0 288 cm⁴ 0 288 cm³ 144 cm⁴
- The product (mixed) moments of areas 1, 2 and 3 about the X_C and Y_C -axes are:
(A) 3126.35 cm⁴ (B) 0 (C) -3126.35 cm⁴ (D) -3126.35 cm³ (E) 36 cm⁴
787.99 cm⁴ -288 cm⁴ -1075.24 cm⁴ -787.99 cm³ -288 cm⁴
1368.60 cm⁴ 0 -1368.60 cm⁴ -1368.60 cm³ 288 cm⁴
- The product (mixed) moment of the cross-section about its centroidal X_C and Y_C -axis is:
(A) -7055.81 cm⁴ (B) 5570.18 cm⁴ (C) -5570.18 cm⁴ (D) 5570.18 cm³ (E) -557.80 cm⁴
- The direction of the principal axes is:
(A) 54.5° (B) 36.1° (C) 45.0° (D) 18.7° (E) 18.7 cm
- The principal moments of inertia are:
(A) 7301.06 cm⁴ (B) 2564.21 cm⁴ (C) 25642.21 cm³ (D) 25642.21 cm⁴ (E) -25642.21 cm⁴
310.76 cm⁴ 730.06 cm⁴ 7301.06 cm³ 7301.06 cm⁴ -7301.06 cm⁴
- The polar moment of inertia are:
(A) 7611.82 cm⁴ (B) 3294.28 cm⁴ (C) 32943.28 cm³ (D) 32943.28 cm⁴ (E) -32943.28 cm⁴



19. The radius of gyration for the section about its centroidal X_C -axis is:

- (A) 4.82 cm (B) 7.75 cm⁴ (C) 60 cm (D) 7.75 cm (E) -7.75cm

20. The radius of gyration for the section about its centroidal Y_C -axis is:

- (A) 7.75 cm (B) 4.82 cm⁴ (C) 23.2 cm (D) 4.82 cm (E) -4.82 cm

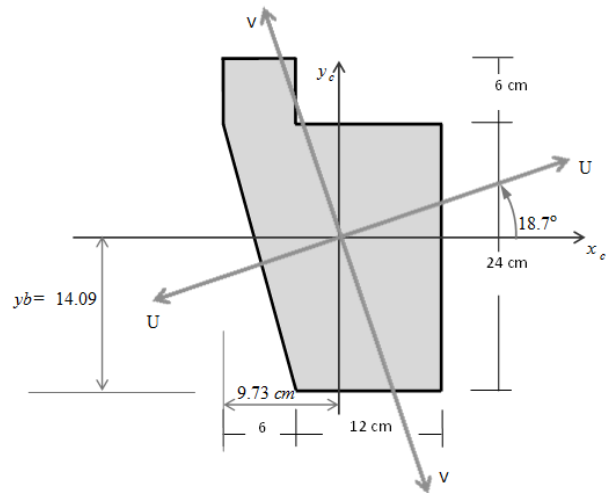
With best wishes

Dr. M. Abdel-Kader

Answer:

- | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | ● | Ⓐ | Ⓑ | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ |
| 2. | ● | Ⓐ | Ⓑ | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ |
| 3. | ● | Ⓐ | Ⓑ | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ |
| 4. | ● | Ⓐ | Ⓑ | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ |
| 5. | ● | Ⓐ | Ⓑ | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ |
| 6. | Ⓐ | ● | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ | Ⓠ |
| 7. | Ⓐ | ● | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ | Ⓠ |
| 8. | Ⓐ | ● | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ | Ⓠ |
| 9. | Ⓐ | ● | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ | Ⓠ |
| 10. | Ⓐ | ● | Ⓒ | Ⓓ | Ⓔ | Ⓕ | Ⓖ | Ⓗ | Ⓚ | Ⓛ | Ⓜ | Ⓟ | Ⓠ |

Element	A	x	y	Ax	Ay	x-xb	y-yb	I_x	$A(y-yb)^2$	I_y	$A(x-xb)^2$	I_{xyc}	I_{xy}
1	36.00	3.00	27.00	108.00	972.00	-6.73	12.91	108.00	5999.21	108.00	1629.22	0.00	-3126.35
2	72.00	4.00	16.00	288.00	1152.00	-5.73	1.91	2304.00	262.41	144.00	2361.72	-288.00	-1075.24
3	288.00	12.00	12.00	3456.00	3456.00	2.27	-2.09	13824.00	1259.11	3456.00	1487.60	0.00	-1368.60
	396.00			3852.00	5580.00			16236.00	7520.73	3708.00	5478.55		-5570.18
										$\tan(2\text{ Theta}) = 0.7646002$			
$xb = 9.73 \text{ cm}$		$I_x = 23756.73 \text{ cm}^4$		$I_u = 25642.21 \text{ cm}^4$		$2\text{ Theta} = 37.40$							
$yb = 14.09 \text{ cm}$		$I_y = 9186.55 \text{ cm}^4$		$I_v = 7301.06 \text{ cm}^4$		$\text{Theta} = 18.70$							



With best wishes

Dr. M. Abdel-Kader