

THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title : Engineering Mechanics I

Subject Code : CCN2251

Session : Semester One, 2017/18

Numerical Answers

Question 1

- (a) $\vec{F} = (-21.2\vec{i} + 11.2\vec{j})\text{N}$; $\vec{M} = (-405\vec{k})\text{N}\cdot\text{cm}$
- (b) $\vec{F}_E = (21.2\vec{i} - 11.2\vec{j})\text{N}$; $l = 7.75\text{ cm}$
- (c) $I_{AD} = 34338\text{ cm}^4$

Question 2

- (a) $\sigma_{AB} = 15\text{ MPa}$
- (b) $\tau_A = 68.8\text{ MPa}$; $\tau_B = 74.5\text{ MPa}$
- (c) $E = 300\text{ MPa}$; $\nu = 0.2$

Question 3

- (a) $F_{AD} = 1875\text{ N}$ (Tension); $F_{BE} = 3750\text{ N}$ (Compression)
- (b) $C_x = 1000\text{ N}$ \rightarrow ; $C_y = 1125\text{ N}$ \downarrow
- (c) $\delta_{AD} = 0.977\text{ mm}$

Question 4

- (a) $T_A = 10.3\text{ N}\cdot\text{m}$; $T_D = 19.7\text{ N}\cdot\text{m}$
- (b) $\phi_{AB} = 3.85^\circ$
- (c) $\tau_{br} = 6.56\text{ MPa}$; $\tau_{dl} = 12.5\text{ MPa}$

Question 5

- (a) $M_{\max} = 3936\text{ kN}\cdot\text{mm}$
- (b) $t_{\min} = 21.9\text{ mm}$
- (c) $\rho = 206\text{ m}$; $\varepsilon_{\max} = 0.0243\%$

Question 6

- (a) $t = 0.866 \text{ s}; s = 1.25 \text{ m}$
- (b) $\ddot{r} = 72 \text{ m/s}^2; F_\theta = 1.25 \text{ N}$

Question 7

- (a) $e = 0.470$
- (b) $\Delta T/T = 0.346$
- (c) $v_A'' = 2.75 \text{ m/s} \leftarrow; v_B'' = 1.82 \text{ m/s} \leftarrow$