

THE HONG KONG POLYTECHNIC UNIVERSITY  
HONG KONG COMMUNITY COLLEGE

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**Subject Title** : Mechanical Services

**Subject Code** : CCN3146

**Session** : Semester Two, 2017/18

**Numerical Answers**

**Question B1**

- (a) Degree of subcooling = 0°C, Degree of superheat = 5°C
- (b) 2.5
- (c) 6.95

**Question B2**

- (a) AB: 315 mm, BC: 250 mm and BD: 200 mm
- (b) Loss at AB = 16 Pa, Loss at BC = 7.2 Pa, Loss at BD = 16.2 Pa

**Question B3**

- (a)  $a_1 = 51.6667$ ,  $a_2 = 0.0019$
- (b) 70.7974 mH

**Question B4**

Paybacks for option 1 = 7.6471 yrs, option 2 = 11 yrs, option 3 = 11.2609 yrs, option 4 = 8.75 yrs

**Question B5**

- (a) 0.0501
- (c) 1000 hrs
- (d) 0.9980

**Question C1**

- (a) 47.7327 kg/s
- (b)(i) 3
- (b)(ii) 0.8333
- (b)(iii) 23.8663 kg/s
- (b)(iv) 11°C
- (b)(v) 3.0968
- (b)(vi) 1018.6328 kW

**Question C2**

- (a)  $H = 11.5 + 500000Q^2$
- (b)  $a = 444444.4444$
- (c) Suction head loss = 1.3287 mH, Discharge head loss = 3.1713 mH
- (d)  $NPSH_{req} = 3.24$  mH, ANPSH = 6.7757 mH
- (e)  $0.0057$  m<sup>3</sup>/s
- (f)  $P_1 = 5.0887$  mH,  $P_2 = 33.0631$  mH

**Question C3**

- (a) Losses at O-1 = 10 Pa, 2-3 = 20 Pa, 4-5 = 75 Pa, 6-7 = 20 Pa
- (b)  $307.415976Q^2$
- (c)  $0.2104$  m<sup>3</sup>/s
- (d)  $433.6069$  Pa
- (f)  $15.1478$  kW

**Question C4**

- (a)  $28.6344$  s
- (b)  $17.6012\%$
- (c)  $97.436571$  s,  $827.6153$  persons