THE HONG KONG POLYTECHNIC UNIVERSITY

HONG KONG COMMUNITY COLLEGE

Subject Title : Foundation Physics **Subject Code** : CCN1108

Session : Semester Two, 2017/18

Numerical Answers

Question B1

(a) $F_{net} = 450$ N; $a = 2.25$ m/s^2
(b) $F_{B \text{ on } A} = 124.5$ N
(c) $F_{A \text{ on } B} = 124.5$ N
$F_{C \text{ on } B} = 249$ N
(d) $F_{net} = 225$ N

Question B2

(a) $f = 2.5$ Hz
$\lambda = 4.8$ m
(b) $f = 425$ Hz
(c) $v = 180$ ms^{-1}

Question B3

(a) $F = 40$ N
(b) $Q = 1.5\ \mu$C
(c)(i) $F = 0.1575$ N
(c)(ii) $E = 1.575 \times 10^5$ N/C

Question B4

(a) Carnot efficiency = 0.422
(b) $N = 2.41 \times 10^{22}$
(c) $T_f = 15.8$ °C

Question C1

(b)(i) $PE_0 = 25$ Nm
(b)(ii) $v_{max} = 5$ m/s
(c)(i) $F_{net} = 200$ N
(c)(ii) Terminal velocity = 40 m/s

Question C2

(a) f = 2500 Hz
(b) No. of nodes = 4
No. of antinodes = 3
(c) $v = 50\ ms^{-1}$
$\lambda = 10$ m
(d)(i) Longest possible wavelength = 7 m
(d)(ii) v = 140 m/s

Question C3

(a)(i) $V_{PQ} = 3.75$ V
(a)(ii) $I_{light\ bulb\ 2} = 0.3375$ A
(a)(iii) $R_{light\ bulb\ 2} = 6.67\ \Omega$
(b) F per unit length = $6x10^{-6}$ N/m; total force = 1.2×10^{-6} N
(c) F = 0.2664 N

Question C4

(b) $Q = 10.54$ kJ
(c) W = 1995 J
(d) $Q_c = 850$J; Carnot efficiency = 0.37