THE HONG KONG POLYTECHNIC UNIVERSITY

HONG KONG COMMUNITY COLLEGE

Subject Title : Engineering Design Fundamentals **Subject Code** : CCN2248

Session : Semester Two, 2017/18

Numerical Answers

Question C1

(a)(i) $diameter\ of\ die = 75\ mm$
$diameter\ of\ punch = 74.68\ mm$
(a)(ii) $blanking\ force\ F = 221{,}896.97\ N$
(a)(iii) $\%\ reduction = 23.81\%$
(b)(i) $drawing\ ratio\ DR = 1.875 < 2$
$reduction\ r = 0.467 < 0.5$
$thickness\ to\ diameter\ ratio = 4.267\% > 1\%$
(b)(ii) $maximum\ drawing\ force\ F_{max} = 118{,}123.88\ N$
(b)(iii) $holding\ force\ F_h = 13{,}424.08\ N$

Question C2

(a)(i) $forging\ force\ F = 245{,}324.99\ N$
(a)(ii) $forging\ force\ F = 717{,}363.94\ N$
(b)(i) $minimum\ number\ of\ passes = 8\ passes$
(b)(ii) $roll\ force\ F = 2{,}356{,}560.92\ N$

Question C3

(c)(i) $V_A = 240\ rpm$
$V_{B2} = V_{B1} = 80\ rpm$
$V_C = 26.67\ rpm$
(c)(ii) $torque\ exerted\ by\ gear\ C = 0.324\ Nm$
(c)(iii) $Mechanical\ Advantage = 9$