

NUMERICAL ANSWERS
ENGINEERING TRIPOS PART IIA 2009
MODULE 3D8: ENVIRONMENTAL GEOTECHNICS & BUILDING PHYSICS

Q1 Flood Protection Dam

(a) See Crib

(b) 2.84 m

(c) i. See Crib ii. $9.37 \times 10^{-5} \text{ m}^3/\text{s/m}$ iii. $P_A = 48 \text{ kPa}$
 $P_B = 3 \text{ kPa}$
 $P_C = -16.6 \text{ kPa}$
 $P_D = 0 \text{ kPa}$

Q2 Heat and Mass Transfer through Porous Media

(a) See Crib

(b) 560.9 kJ

(c) i. 4.78 years ii. 28.9% ; 3.39% ; 0.16% ; 0%

Q3 Heat Transfer through Transparent Surfaces

(a) 2.76 W/m²K

(b) 441.98 W

(c) -1382 W

(d) 185.6 W

Q4 Condensation in Walls

(a) 5.5°C

(b) 5.22 > 3.12

(c) $1.23 \times 10^3 \text{ g} \times (\text{t/area})$

(d) $1.08 \times 10^3 \text{ g} \times (\text{t/area})$

R. Choudhary (Principal Assessor)