

Answers to the Exam's Questions for AY1819 Semester 1

Code	Course Title	Question	Answer
CV0002	Engineers and Society		No Numerical Answer
CV1011	Mechanics of Materials	Q1(a)	$F_1 = 200\text{N}\downarrow, F_{2DE} = -300\text{N}\uparrow, F_R = 200\text{N}, R_y = 200\text{N}, M_x = 600\text{ Nm}, M_z = 1200\text{ Nm}$
		Q1(b)	$T_{CD} = 58.8\text{kN}, A_y = 16.8\text{kN}, A_x = 62.8\text{kN}, P = -6.63\text{kN (compression)}, V = 3.83\text{kN}, M = -9.575\text{kNm}$
		Q2(b)	0
		Q3(a)	$W + \frac{1}{3}w_0 \leq 10.0 \text{ \& } W \geq \frac{1}{3}w_0$
		Q3(bi)	$T_C = \frac{3(G_s + 2.1605G_a)}{7G_s + 6.4815G_a}T, T_A = \frac{4G_s}{7G_s + 6.4815G_a}T$
		Q3(bii)	$\tau_{\max} = \left(\frac{6.036G_s}{7G_s + 6.4815G_a}\right)\frac{T}{d^3}$
		Q4(a)	$\tau_{\max} = \left(\frac{6.036G_s}{7G_s + 6.4815G_a}\right)\frac{T}{d^3}$
		Q4(b)	$\tau_{\max} = 35.2\text{MPa}, \sigma_1 = 16.7\text{MPa}, \sigma_2 = -53.6\text{MPa}$
CV2011	Structural Analysis I	Q1(b)	$V_A = 1.5P, V_B = 1.5P$
		Q1(c)	$N_{cJ} = -\sqrt{2}H_c = -0.707P = +\frac{\sqrt{2}}{2}P \parallel$ $N_{oB} = -\frac{P}{2} = -0.5P \parallel$
		Q2(b)	$R_E = 11.524\text{kN}, R_C = 23.689\text{kN}, R_{Ay} = -6.213\text{kN}, M_A = -40.85\text{ kNm}.$
		Q2(c)	$M_E = 7.03\text{kNm}, V_B = 14.213\text{kN}, V_D = 9.476\text{kN}, M_C = 14.214\text{kNm}$
		Q3(a)	$\frac{3.375}{EI} \text{ } \frac{\text{kNm}^2}{EI}$
		Q3(b)	$\frac{118.3}{EI} \text{ } \frac{\text{kNm}^2}{EI}$
		Q4(a)	17.9m↓
		Q4(b)	$0.991 (10^{-3}) \text{ rad}$

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CV2013	Engineering Geology and Soil Mechanics	Q1(d)	Dip direction/Dip = 280/57
		Q2(aiii)	22m
		Q3(ai)	1.296 m ³ / day
		Q3(aii)	Point A = 95kPa, Point E = 205kPa
		Q3(aiii)	70 kPa
		Q3(aiv)	1.11 x 10 ⁻⁴ cm/s
		Q3(bii)	50.89 m ³ /day
		Q4(ai)	3.99 x 10 ⁻² cm/s
		Q4(aii)	10 kPa
		Q4(bi)	50kPa, 13kPa
		Q4(bii)	122 kPa, 13 kPa
		Q4(biii)	85kPa
		Q4(biv)	0.652m
		Q4(bv)	1.472 yr
Q4(bvi)	41.4%		
CV2015	Hydraulics	Q1(b)	0.5m
		Q2(b)	8.86m ² /s
		Q2(ci)	1.313m
		Q2(cii)	2.115m
		Q3(bi)	$\frac{h}{8} \left[\sqrt{1 + 512F^2} - 1 \right]$
		Q3(bii)	0.678m
		Q4(bi)	-225m
CV3011	RC Design	Q2(a)	8T32
		Q2(b)	H12@175, H12@300, H12@175
		Q3(a)	1303 mm ²
		Q4(a)	12,420 kN
		Q4(b)	N = 2471kN, M = 1569kNm
		Q4(c)	M = 1081 kNm
CV3012	Steel Design	Q3(b)	F _c = 604.557kN M _{y,ED} = 9.963kNm M _{z,ED} = 5.099kNm
		Q4(b)	Plain Shear = 325.8kN, Blocking Tearing = 394.624kN
CV3013	Foundation Engineering	Q1(ci)	40kPa, 1.5
		Q1(cii)	60 and 54 kPa
		Q1(ciii)	3.1
		Q2(bii)	163mm
		Q3(a)	14.14m

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CV3014	Transportation Engineering	Q1(a)	2000veh/h
		Q1(b)	300m
		Q2(a)	420m
		Q2(b)	6.3m
		Q3(a)	8583
		Q4(a)	9.5
		Q4(b)	6.33
		Q5(b)	5422m ³
		Q7(bi)	3.55 x 10 ⁶
		Q7(bii)	160 (surfacing), 90 (base), 240 (s/base)

CV3015	Environmental Engineering	Q1(a)	0.33
		Q1(bii)	99.9999%
		Q1(cii)	675 m ³ /h
		Q2(ai)	100%
		Q2(bi)	0.233m
		Q3(ai)	2.3148m
		Q3(aii)	0.0318m
		Q3(aiii)	0.1893m
		Q4(a)	71.97
		Q4(b)	3040m ³ /d

CV4011	Project Planning & Management	Q3(ai)	\$2,410k, \$2,777,78
		Q3(aii)	26.88%
		Q3(aiii)	\$647,778, \$437,778

CV4101	Structural Analysis III	Q1(a)	2																
		Q1(b)	$\begin{bmatrix} u_4' \\ v_4' \end{bmatrix} = \begin{bmatrix} 6.58 \cdot 10^{-4} \\ 4.08 \cdot 10^{-4} \end{bmatrix} \text{ m}$																
		Q1(c)	$\begin{bmatrix} u_4' \\ v_4' \end{bmatrix} = \begin{bmatrix} 1.0 \cdot 10^{-3} \\ 1.0 \cdot 10^{-3} \end{bmatrix} \text{ m}$																
		Q1(cii)	$\begin{bmatrix} u_4' \\ v_4' \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \text{ m}$																
		Q2(a)	2																
		Q2(b)	$\begin{bmatrix} \psi_2' \\ \theta_2' \end{bmatrix} = \begin{bmatrix} -8.54 \cdot 10^{-3} \\ -4.69 \cdot 10^{-3} \end{bmatrix} \text{ m}$																
		Q2(c)	28.28kN																
		Q3(a)	<table border="0"> <tr><td>Joint</td><td>DOF</td></tr> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>1</td></tr> <tr><td>5</td><td>1</td></tr> <tr><td>6</td><td>0</td></tr> <tr><td>7</td><td>1</td></tr> </table>	Joint	DOF	1	0	2	3	3	3	4	1	5	1	6	0	7	1
		Joint	DOF																
		1	0																
		2	3																
		3	3																
4	1																		
5	1																		
6	0																		
7	1																		
Q3(b)	3																		
Q4(a)	0.3708, $P_{cr} = 0.3708 \frac{\pi^2 EI}{L^2}$																		
Q4(b)	Spring constant : $\alpha = \frac{6EI}{L}$ $\beta = \frac{12EI}{L^3}$																		

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CV4102	Advanced Steel Design	Q1(a)	$\beta = 0.6, \gamma = 6.0,$
		Q1(b)	31%, -31.360mm
		Q1(c)	893.18kN
		Q2(c)	8mm
		Q3(d)	420.31kN/m
		Q4(a)	760kNm
CV4107	Engineering Economics and Finance	Q1(a)	A
		Q2(ai)	\$2,403.12
		Q2(aii)	\$3,987.69
		Q2(b)	$X < 32,418.40$
		Q4(ci)	\$88.33
		Q4(cii)	\$112.5
CV4110	Excavation and Retaining Walls	Q1(i)	2.265
		Q1(ii)	129.92kN/m
		Q2(ai)	2400 kN/m
		Q2(aii)	2.316
		Q3(a)	189.7kN/m
		Q3(bi)	14 kPa
		Q3(bii)	313.6kN/m
		Q3(c)	32.9kN/m
		Q4(a)	$K_a = 0.283, P_a = 74.2\text{kN/m}, M = 133.6\text{kN-m/m}$
		Q4(c)	0.991m
		Q4(d)	0.134m
Q4(e)	Row 1 = 122.6kN, Row 2 = 99.75kN, Row 3 = 73kN		
CV4112	Traffic Engineering	Q2(a)	$C_o = 170s, G_A = 40s, G_B = 32s, G_C = 39s, G_D = 43s$
		Q3(a)	Movement 1 = 629 veh/h Movement 9 = 733 veh/h Movement 7 = 151 veh/h Shared = 244 veh/h
		Q3(b)	107.9, LOS F
		Q4(b)	LOS D
		Q5(b)	40hrs, 18.2hrs, 10hrs
		Q6(b)	\$4.25
CV4120	Advanced Reinforced Concrete Design	Q1(a)	159.6kNm
		Q1(b)	29.1mm
		Q3(aii)	$w_u = \frac{12m}{6.4y}$
		Q3(bi)	12.56kN/m^2
		Q3(biii)	Middle: 16.75kNm, 8.375kNm Edge: 3.14kNm, 2.10kNm, 1.04kNm
		Q4(bi)	3877.3kN, 2189.5kN
		Q4(bii)	5035mm^2

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Code	Course Title	Question	Answer
EN2001	Environmental issue in a Changing World	Q1(bi)	12.6
		Q2(aii)	14.6 mil
		Q3(b)	39.7%
EN2002	Environmental Biology and Microbiology	Q1(i)	a
		Q1(ii)	b
		Q1(iii)	d
		Q1(iv)	c
		Q1(v)	b
		Q1(vi)	a
		Q1(vii)	b
		Q1(viii)	c
		Q1(ix)	b
		Q1(x)	c
		Q2(ai)	P
		Q2(aii)	1360kg
		Q2(bi)	0.2 mole of NH_4^+ and 1.87 mole of O_2
		Q2(bii)	3.74 mole
		Q2(biii)	35.6%
Q2(c)	Specific growth rate = 0.60 day^{-1} , Doubling time = 1.2 day		
Q4(a)	$6 \times 10^6 \text{ CFU / ml}$		
EN3001	Soild & Hazardous Waste Management	Q3(a)	1324°C
		Q3(bi)	7
		Q3(bii)	0.04 m^3 or 40L, one 40L can
		Q3(ci)	11448 KJ / Kg
		Q3(cii)	9999 KJ / Kg
EN3002	Wastewater Engineering	Q1(a)	Total solids = 3040 mg/L , Total volatile solids = 1820 mg/L
		Q1(ci)	$0.34 \text{ g O}_2 / \text{g Phenol}$
		Q1(ei)	$4 \times 10^{-4} \text{ m/s}$
		Q1(eiii)	$34.8 \mu\text{m}$
		Q2(a)	152.7 kg/day
		Q3(ai)	$62.3 \text{ m}^3/\text{d}$
		Q3(aii)	9.4d
		Q3(bi)	320 mg/L
		Q3(bii)	220 mg/L
		Q3(biii)	88.2 mg/L
		Q3(biv)	20 mg/L
		Q4(ai)	8.3d
		Q4(aii)	990 m^3
		Q4(aiii)	0.5d
		Q4(aiv)	$2765 \text{ m}^3/\text{d}$
Q4(av)	$4254 \text{ m}^3/\text{d}$		
Q4(avi)	$596,584 \text{ gTSS/d}$		
Q4(avii)	10142 g/d		

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EN3003	Environmental Transport Processes	Q1(a)	18.7 kg/m ⁻³
		Q1(b)	-138 mg/s, towards Injection 1
		Q1(c)	4.3 hrs delay
		Q2(ai)	316 mg/L
		Q2(aii)	44mg/L
		Q2(aiii)	67mg/L
		Q4(a)	20kg/d
		Q4(b)	4mg/m ² .d
		Q5(a)	8.3 mg/L
		Q5(b)	K _G = 24.9m/h, K _L = 0.0266m/h, K _{tot} = 0.0266m/h
		Q5(c)	14 days
EN4104	Environmental Hydraulics	Q1(ai)	22.91 day
		Q1(aii)	190days
		Q1(bii)	0.454
		Q2(a)	0.490 d ⁻¹
		Q2(c)	0.4 m ³ /s
		Q3(bi)	Jet-like, x=0.25m Plume-like, x=3.0m,3.25m,3.5m
		Q3(bii)	Jet-like, a = 5.55, b = -1 Plume-like, a = 9.05, b= -5/3
		Q4(a)	Fr _{max} = 5.5, Fr _{min} = 2.2
EN4105	Integrated Environmental Management	Q4(cii)	0.432 x 10 ⁹ kJ/day

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Code	Course Title	Question	Answer
EM9104	Air Quality Management	Q1(d)	579.6kg
		Q5(ai)	255.27 mg/m ³
		Q5(aii)	24.3 kg/h
		Q5(bi)	8.0um, 75%
EM9105	Energy Resources Management	Q4(ai)	Oil = 1.51%, NG = 1.51%
		Q4(aii)	Oil = Year 2059, NG = Year 2056.
		Q4(bi)	7.29x10 ⁶ m ²
		Q4(bii)	5.24%

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Code	Course Title	Question	Answer
MT1001	Mathematics I for Maritime Studies	Q1(a)	(1.9318, \$ 3.95)
		Q1(b)	(3.69977, \$ 376)
		Q1(c)	0.99
		Q2(ai)	111 months
		Q2(aii)	\$69,205.09
		Q3(cii)	3.436
		Q4(b)	3
		Q4(c)	1/30
MT1002	Introducation to Maritime Studies		No Numerical Answer
MT1003	Trade Practice and Incoterms		No Numerical Answer
MT2002	Shipping Economics		No Numerical Answer
MT2003	Maritime Technology		No Numerical Answer
MT4001	Shipping Logistics	Q1(ai)	395, 197.5
		Q1(aii)	13.16
		Q1(aiii)	7898
		Q1(bi)	\$8,200
		Q1(bii)	497.57
MT4002	Essentials of Project Management		No Numerical Answer
MT4003	Maritime Strategy		No Numerical Answer
MT4101	Intermodal Transportation	Q3(a)	793 TEUs, 1005TEUs
		Q3(b)	19.96knots, A = 883, B = 1,118
MT4104	Information Technology Management		No Numerical Answer

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SU3001	Integrated Urban Management		No Numerical Answer