Answers to the Exam's Questions for AY1819 Semester 2

Code	Course Title	Question	Answer
CV0001	Civil Engineering and Sustainable Built Environment	Section A	
		Q1	A
		Q2	C
		Q3	B
		Q4	A
		Q5	C
		Q6	B
		Q7	C
		Q8	C
		Q9	C
		Q10	C
		Q13	T
		Q14	T
		Section C	
		Q1	A
		Q2	C
		Q3	A
		Q4	B
		Q5	C

CV0002	Engineers and Society		No Numerical Answer

CV1011	Mechanics of Materials	Q1(a)	$(-114.374\mathbf{i}+185.626\mathbf{j}-590.623\mathbf{k})N$ $(-628.13\mathbf{i}-571.87\mathbf{j})Nm$ $848.53Nm$
		Q1(b)	$F_{BF}=\frac{50\sqrt{20}}{4}kN(C)$ $F_{BC}=F_{BF}(\frac{2}{\sqrt{20}})=25kN(T)$ $F_{CG}=\frac{100\sqrt{20}}{4}=111.80kN(C)$
		Q2(a)	$F_{BC}=250N$
		Q2(b)	$F_{CF}=\frac{4}{3}=1.33kN$ $F_{EB}=\frac{10}{3}=3.33kN$ $23.8^{o}C$
		Q3(a)	$2.828\text{x}10^{-3}\ \tau a$ $2.313\text{x}10^{-5}\sigma a$
		Q3(b)	265.1Nm, 15.1°
		Q4(a)	16.52°, 5.15°, 110.09°, 132.02°
		Q4(b)	Point a: 62.8MPa, 125.6MPa, 0MPa Point b: 88.4MPa, 176.6MPa, -0.16MPa

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Code	Course Title	Question	Answer
CV1012	Fluid Mechanics	Q1(a)	V10 = 0.020006002m^3 V50 = 0.020242915m^3 25,460,526N/m^2
		Q1(b)	4.905m/s^2 0.068125m/s
		Q1(c)	2943N/m^2, 0.0787 m^3/s
		Q1(d)	184,428N, 2.4m
		2(a)	P_{1s} = 14,715 N/m^2, P_{2s} = 24,328.8 N/m^2 V_1 = 4.43m/s, V_2 = 5.33m/s
		2(b)	218.3N
		3(bi)	0.15m
		3(bii)	0.2m
		4(bi)	4.37m
		4(bii)	579.5N
		4(ci)	2.33
CV1013	Civil Engineering Materials	Q1(b)	d = 2.29g/cm3, VTM = 4.03%, VFB = 79.5%, Yes
		Q2(ai)	91.4%, 8.6%
		Q2(aii)	85.4%, 14.6%
		Q2(bi)	6%
		Q2(bii)	6%
		Q3(a)	B
		Q3(bii)	Total V = 0.65x
		Q3(biv)	Eparallel
		Q3(e)	28mm
		Q4(a)	B
		Q4(d)	0.28
CV2011	Structural Analysis I	Q1(b)	Rjx = 7.143kN, Rjy = 2.86kN, Ray = 7.857kN, Rax = 22.857kN
		Q1(c)	FDB = 0, FDE = 0, FAD = 11.11kN, FAB = 15kN, FCD = 21.213kN, FED = 15kN, FFD = 10.102kN, FHJ = 8.929kN, FGJ = 2.5kN, FHG = 4.167kN, FFG = 3.333kN, FFH = 13.09kN
		2(a)	Rax = 5kN, Ray = 5.083kN, Rdy = 7.917kN
		Q3(a)	$P = \frac{3}{8} ql$
		Q3(b)	$P = \frac{1}{2} ql$ $\delta_B = -\frac{1}{72}\frac{ql^4}{EI}$
		Q4(a)	$\delta_D = \frac{128}{EI} - \frac{32}{3}\frac{1}{AE}$ (↓)
		Q4(b)	$-\frac{36}{EI}$ (↓)

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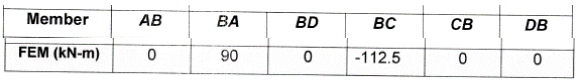
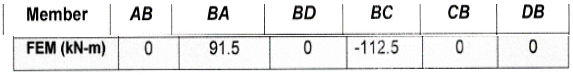
Code	Course Title	Question	Answer
CV2012	Structural Analysis II	Q1(a)	240kN
		Q2(ai)	$B_y = 24.2\text{kN}\ (\uparrow)$
		Q2(b)	$B_y = 17.6\ kN\ (\uparrow)$
		Q3(a)	MAB = 44.12kNm, MBA = -8.23kNm, MBC= 8.23kNm, MCB = 51.37kNM, MCD = -51.37kNm $R_D = 37.15\ kN \quad (upward)$ $R_C = 77.7\ kN \quad (upward)$
		Q3(b)	MAB = 260kNm, MBA = 600kNm, MBC = -600kNm, MCB = 200kNm, MCD = -200kNm, MDC = 0
		Q4(a)	
		Q4(b)	
		Q4(c)	MBA = -300kNm, MBC = 300kNm, MAB = MCB =MBD = MDB = 0kNm

CV2014	Ground Engineering	Q1(a)	6.71kN
		Q1(bi)	400kPa
		Q1(ci)	200kPa
		Q1(cii)	100kPa
		Q1(civ)	198kPa
		Q2(bi)	19.8kPa, 0kPa, 80kPa, 3.3kPa
		Q2(biii)	382.75kN/m
		Q2(biv)	299 kN/m
		Q2(c)	75kPa
		Q3(aii)	225.33kN/m
		Q3(aiii)	722.67kN/m
		4(ci)	$1.3m^3$
		4(cii)	54.65%, 52.08% 60.21%, 37.7%

CV2016	Hydrology	Q1(bi)	a = 100.1474, k= -29.3559 a = 59.51919, k = 31.23536
		Q1(bii)	91mm
		Q1(biii)	141mm
		Q1(ci)	106 L/s
		Q1(ciii)	20.77 years
		Q1(civ)	54m below MSL
		Q2(c)	4,264,000 m3

Answers to the Exam's Questions for AY1819 Semester 2

Code	Course Title	Question	Answer
CV2019	Matrix Algebra & Computational Methods	Q1(b)	$\mathbf{H}^{18} = \begin{bmatrix} (2\mathbf{a})^{17}\mathbf{a} & (2\mathbf{a})^{17}\mathbf{a} & \mathbf{0} & \mathbf{0} \\ (2\mathbf{a})^{17}\mathbf{a} & (2\mathbf{a})^{17}\mathbf{a} & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{10}^{18} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{10}^{18} \end{bmatrix}$
		Q2(a)	-27
		Q2(bii)	-14, 8
		Q2(biii)	-5, -2, 3
		Q2(biv)	$\mathbf{x}_1' = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, \quad \mathbf{x}_2' = \begin{bmatrix} 1 \\ -2 \\ 7 \end{bmatrix}, \quad \mathbf{x}_3' = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$
		Q3(ai)	1150 m3
		Q3(aii)	5.79 gm
		Q3(aiii)	5.05 mg/m3
		Q3(bi)	4
		Q3(bii)	696.7 m/s, 950.3m/s
		Q3(biii)	89.5 m/s2
		Q4(a)	0.100m, 0.0862m
		Q4(b)	21.17°C, 20.03°C
CV3012	Steel Design	Q3(a)	$M_{y,Ed} = 27.618 / 2 = 13.809 \text{ kNm}$ $M_{z,Ed} = 3.155/2 = 1.578 \text{ kNm}$
		Q4(a)	57.244kN, 45.0kN
		Q4(c)	81.972kNm, 788.776kN
CV3016	Construction Technology and Processes	Q1(ci)	7.47 min
		Q1(cii)	216.6 m3/h
		Q1(ciii)	89.6%
CV4107	Engineering Economics & Finance	Q1(a)	C
		Q2(ai)	$4,756.33
		Q2(biii)	30,000, 5,275.93
CV4111	Ground Engineering	Q1(d)	1.23 m3
		Q1(e)	1.98 g/cm3, 11.9%
		Q2(a)	0.21
		Q2(b)	0.61
		Q2(b)	226.1kN
		Q4(a)	1.33
CV4113	Highway Engineering	Q1(a)	1.5×10^9 N/m2
		Q2(a)	42 MPa, 100MPa
		Q2(ci)	1050mm
		Q2(cii)	2.5kN
		Q4	71.531 dB, 64.40 dB
		Q5(ai)	0.13 m3/s
		Q5(aii)	0.43m, 0.17m
		Q5(aiii)	1.03m/s, 0.50

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Code	Course Title	Question	Answer
CV4119	Advanced Prefrabication and Precast Construction	Q1(a)	15.76kN, 13.08kN
		Q1(b)	1.423 N/sq mm, 8.57kNm
		Q1(c)	16.43kN, 12.32kN ± 1.658
		Q2(b)	465mm
		Q2(c)	T10 - 300
		Q3(a)	30N/mm2
		Q3(b)	450mm, 51869259mm3, 25934630mm3
		Q3(c)	2460.38kN
		Q4(a)	Iy = $2.005 \times 10^{10} mm^4$ Ix = $13.73 \times 10^8 mm^3$ Zy = $42.27 \times 10^6 mm^3$ Zx = $9.64 \times 10^6 mm^2$
		Q4(b)	93.84 kNm
CV8011	Human Resources Management and Entrepreneurship		No Numerical Answer

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Code	Course Title	Question	Answer
EN0001	**Sustainability Practices for Urban and Marine Environment**	**Q1(i)**	d
		Q1(ii)	b
		Q1(iii)	a
		Q1(iv)	b
		Q1(v)	b
		Q1(vi)	c
		Q1(vii)	b
		Q1(viii)	d
		Q1(ix)	d
		Q1(x)	d
		Q2(gii)	At 5 min = 227,425. At 15 min = 10,557.3, At 20 min = 2,275
		Q4(c)	TS = 722mg/L, TVS = 338 mg/L, SS = 242mg/L, TDS = 480mg/L
EN1001	**Environmental Chemistry**	**Q1(c)**	340 mg/L
		Q1(d)	215.8 mg/L
		Q2(b)	5,704.61 kg/y
		Q2(cii)	3.23
		Q3(a)	3.13%
EN2003	**Water Supply Engineering**	**Q1(ai)**	28,000 m^3
		Q1(aii)	8,000 m^3/hr
		Q1(b)	200m
		Q3(aii)	2.68 mg/L
		Q4(a)	21.4
		Q4(bi)	3.71 x 10^{-3} m/s
		Q4(bii)	128217.6 m^3/d
EN3004	**Air Pollution Control Engineering**	**Q2(a)**	$901\ \frac{\mu g}{m^3}$
		Q3(ai)	79.1%
		Q3(aii)	1.683 kg/s
		Q4(ai)	96.5%
		Q4(bi)	6.194 x 10^{-5} mol/L, 4.2
EN4102	**Membrane Water Reclamation Technology**	**Q2(a)**	3.22 kWh/m^3
		Q5(a)	100 d
		Q5(b)	0.3 kg/m^3d
		Q5(c)	0.09375 d^{-1}
		Q5(d)	185.2 m^2

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Code	Course Title	Question	Answer
EM9101	Environmental Quality	Q2(b)	23,100 kg
EM9106	Environmental Impact Assessment	Q2(a)	5.07 mg/L
		Q5(ai)	0.384,0.526
		Q5(b)	86 dBA
		Q5(c)	57.8 km/h
EM9107	Environmental Health and Safety Management	Q5(ai)	0.097 ppm
		Q5(c)	49 mg/L

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Code	Course Title	Question	Answer
MT0001	Shipping and the Environment	No Numerical Answer	
MT0002	Professional in Society	No Numerical Answer	
MT1004	Meteorology and Oceanography	Q1(i)	b
		Q1(ii)	b
		Q1(iii)	c
		Q1(iv)	b
		Q1(v)	a
		Q3(aii)	21.94 km
		Q4(i)	d
		Q4(ii)	c
		Q4(iii)	d
		Q4(iv)	b
		Q4(v)	a
MT2004	Mathematicss II for MS	Q1(ai)	$a \neq 0, 1, 2$
		Q1(aiii)	Unique solution: a ≠ 0 1, 2 Multiple soln: a = 2 No soln: a = 0, 1
		Q2(ai)	0.125
		Q2(aii)	-6
		Q2(b)	m= 4, n = 3
MT2005	Port Economics	No Numerical Answer	
MT2006	Regulatory Framework of Shipping	No Numerical Answer	
MT3005	Quality Management in Shipping	No Numerical Answer	
MT3006	Ship Chartering	Q1(a)	3
		Q1(b)	Profit $0.11 per metric ton
		Q1(c)	Profit $1.65 per metric ton
MT4102	Distribution and Warehousing	Q1(ai)	94.3%
		Q1(aii)	1550 units
		Q1(aiii)	X ≥ 0.3656.
		Q3(a)	X ≤ $0.4154
		Q3(c)	3.78, 6.55
MT4103	Port Planning & Operations	Q4(c)	2.568 d

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Code	Course Title	Question	Answer
SU2001	**Urban Planning and**	**Q2(b)**	2777 trips