Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV1011

Course Title : Mechanics of Materials

Tabulated By : Au Siu Kui, Liu Yu (Part-time)

Question No	Answer
1	(a)M_A=-2.622T_1i+3.495T_1j; (b) T_1=45.8kN, T_2=26.7kN; (c) Ax=8.89kN, Ay=16.7kN, Az=40.0kN
2	(a)Ax=0, Ay=6kN ↑ , Ey=6kN ↓ ; (c) $M(x) = 6x-2x^2$ $(0\leq x\leq 3)$
3	(a) 60kN, 15kN, 4kN; (b) 1.6e-3 deg; (c) 0.849MPa, 0.4716 Mpa
4	(a)(i) 20MPa (70 deg), 6MPa (-20 deg); (ii) 7.64MPa, 4.5MPa; (b)(i) 72mm; (ii) 5.63Nm

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV 2011

Course Title : Structural Analysis I

Tabulated By : LI Bing, Fu Yuguang

Question No	Answer
Q1	18,42,42,42,18,0,0 KN
Q2	2.07, 4.71 KN; 4.14 KNm, 4.93,3.29 KN V 2.07, 4.93,4.71,3.29,4.93KN M: 4.14,2.07,9.86
Q3	11 KN, 39 KNm; 0,0, 29.5,73.125; -22.5, 4, -33.75, 4/3, -4.5, 3/4; -60.75, -1809
Q4	-68.284, 1.138 mm; 45 KN, 50 KN, -5 KN; 100 KNm; 1 KNm; 4 KNm; 0.00213 rad; 24 mm

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV2012

Course Title : Structural Analysis II

Tabulated By : Qian Shunzhi and Zhao Ou

Question No	Answer
1	N.A. as it is drawing (Influcen lines)
2	Ex=14.06kN(left), Ax=14.06kN(right), Ay=30kN(up), Ey=50kN(up)
3	(a) MAB=-75.5 kNm, MBA=208.9 kNm, MBC=-240 kNm, MBD=31.1 kNm; (b) VBA=142.2 kN, VAB=97.8 kN, VBC=40 kN, VDB=31.9 kN, VBD=8.1 kN
4	(a) R1y=12.4 kN, M1θ=16.8 kNm, R2y=30.5 kN, R3y=17.1 kN, M3θ=-10.8 kNm

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV2014

Course Title : Geotechnical Engineering

Tabulated By : Wu Wei

Question No	Answer
1(a)(i)	33°, 26°
1(a)(ii)	26°
1(b)(i)	14.5°, 60 kPa
1(b)(ii)	58 kPa, 225 kPa
2(a)	15.84 kPa, 12 kPa, 14 kPa
2(b)	16.33 kN/m
3(a)(i)	507.6 kN/m
3(a)(ii)	38.24 kPa
4(d)	98.5%, 32.25%

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV2019

Course Title : Matrix algebra and numerical methods

Tabulated By : Au Siu Kui, Liu Yu (Part-time)

Question No	Answer
1	(a) 3, -2 1; (b) -32, -6; (c) -512
2	(a) -1, 3; [-2; 1]/sqrt(5); (b) (i) 1
3	(a) $x(7) \approx 22.64$m, $v(7) \approx 4.84$m/s, $a(7) \approx 0.37$m/s^2; (b) A=10.03m^2, $\int x dA = 57.61$m^3, $x_c = 5.75$m
4	(a) v=50.39 m/s (b) v=57.53 m/s

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV2020

Course Title : Water Resources Engineering

Tabulated By : Qin Xiaosheng

Question No	Answer
1a	Crest Vc=1.213, flow per width = 0.182 m2/s, discharge Q = 5.459 m3/s
1b	normal depth in B-C: 1.4053 m
1c	flow depth at the depression: 1.9152 m
1d	height of end-sill=0.6088 m
2b	14.8 million m3
2c	(1) 108 km2, (2) [0 20 40 60 30 0] m3/s for t =[0 2 4 6 8 10], (3) [0 80 240 400 360 120 0] m3/s
3a	[0 22 36 46 30 12 8 0] m3/s
3c	(1) 1,184,000 m3, (2) [30 30 25 52.5 161.25 225.625] m3/s

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV3012

Course Title : Steel Design

Tabulated By : Lie Seng Tjhen

Question No	Answer
Q1.(a)	BM at A = 428.10 x 2 = 856.22 kNm; BM at C = 856.22 + 46.95(3.5) = 1020.53 kNm
	V at B = 428.10 - 381.15 = 46.95 kN; V at C = 46.95 - 455.17 = -408.22 kN
Q1.(b)	LTB check for segment BC is NOT OK.
Q1.(c)	Additional moment capacity = 441.76 kNm
Q2.(a)	BM at B = 1023.75 kNm; BM at C = 877.5 kNm
	V at A = 341.25 kN; V at B and C = -48.75 kN; V at D = -438.75 kN
Q2.(b)	A-Type(c)=341.25kN; B-Type(a)=390kN; C-Type(a)=390kN; D-Type(c)=439.75kN
Q2.(c)	Web bearing and buckling resistance, FRd = 819.6 kN
Q3.(a)	NEd = 2371.5 kN; My,Ed = 22.770 kNm; Mz,Ed = 16.675 kNm
Q3.(b)	The 260 x 260 x 108 kg/m SHS section is satisfactory.
Q3.(c)	The 260 x 260 x 108 kg/m SHS column is still adequate to carry the total
	design actions.
Q4.(a)	A required = 90350.815 mm2
Q4.(b)	A effective = 1486.4c + 10553.44; c = 53.685 mm; t = 21.500 mm
Q4.(c)	F = 1383.285 kN; T = 103.285 kN
	A effective = 4c2 + 628.4c + 4260; c = 93.251 mm; t = 37.345 mm
	The 50 mm thick base-plate is still adequate to resist the total design actions.

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV3016

Course Title : Construction Technology and processes

Tabulated By : Rtiong

Question No	Answer
1	no numerical answer
2	nil
3	min number of trucks = 10 . Cost= $29550.
4	nil

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV4111

Course Title : Ground Engineering

Tabulated By : Yi Yaolin

Question No	Answer
1.a	0.67
1.c	6 m
2.c	1.78 yr
2.d	0.371 > 0.355

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** CV4113

Course Title : Highway Engineering

Tabulated By : Lum Kit Meng

Question No	Answer
1(b)	5.69 million ESAL
2(b)	Fatigue damage = 137.2% and Erosion damage = 120.2%
3(a)	(i) Noise level = 73.2 dB; (ii) Barrier height = 1.76 m
4(a)	(i) Overland flow path length = 12 m; Time of concentration = 1.94 minutes; Rainfall intensity = 205.74 mm/hr; (ii) Sheet flow depth = 4.46 mm

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV4120

Course Title : Advanced Reinforced Concrete

Tabulated By : Tan Kang Hai

Question No	Answer
1(a)	2.80 m < L <18.1 m
2(a)(i)	M_{ult} = 3557 kNm
2(a)(ii)	A_s =1801 mm^2
2(b)(i)	$V_{Ed,1d}$ = 651.5 kN
2(b)(ii)	A_{sw}/s = 0.395
3(a)	w = 12.9 kN/m^2
3(b)(i)	M_{max} = 6.45 kNm
3(b)(ii)	M_{max} (hogging) = 25.8 kNm
	M_{max} (sagging) = 14.51 kNm
	ratio = 1.78
3(c)(i)	A_s = 135.7 mm^2/m
3(c)(ii)	A_s = 499.5 mm^2/m (hogging) ; A_s = 280.9 mm^2/m (sagging)
4(b)	beta cannot exceed 0.5

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** CV5101

Course Title : Civil engineering and sustainable build environment

Tabulated By : Wang Zhiwei, Darren Sun, Yi Yaolin, David Chew

Question No	Answer
A2	(a) 875; (b) 127322
B	DCBC
C	DDBBDB
D1	DBADCACC

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** EM5101

Course Title : Environmental Quality

Tabulated By : Xunchang Fei

Question No	Answer
1	all text
2	b: 342.5 lpcd; e: 350 mg/L 57% 43%;
3	all text
4	all text
5	false false false

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** EM5107

Course Title : Environmental, Health and Safety Management

Tabulated By : Hor Nam Chook

Question No	Answer
2(d)(ii)	TWA8 concn for TEA = 0.375 ppm, C/PEL = 0.375 TWA8 concn for MeOH = 25 ppm, C/PEL = 0.125 Sum of C/PEL = 0.50 (< 1)
3(b)(i)	SPL = 86.6 dBA
3(b)(ii)	Leq = 83.6 dBA
3(d)	RWL (origin) = 8.95 RWL (destination) = 7.55 LI (origin) = 0.56 LI (destination) = 0.66
5(a)	C (mg/m3) = 0.075 mg/m3 C (ppm) = 0.029 ppm
5(e)	BOD5 (total) = 61 mg/L BOD5 (wastewater) = 2,050 mg/L

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** EN2002

Course Title : Environmental Biology and Microbiology

Tabulated By : Cao Bin

Question No	Answer
2(a)	S = 5, E = 1.00 at t = 0; S = 5, E = 0.865 at t = 7 day; S = 4, E = 0.856 at t =14 day; S = 4, E = 0.730 at t = 21 day
3(b)	6 × 10^6 CFU/mL

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** EN2003

Course Title : Water Supply Engineering

Tabulated By : Grzegorz Lisak

Question No	Answer
2 (a)	Find Q in each pipe using the **Hardy Cross** method. L_1 =1000m, L_2 =1200m, L_3 =1200m; D_1 =300 mm, D_2 =200mm, D_3 =300mm; C =100. For the initial trial: assume Q_1 = 1.5 m^3/s, then Q_2 = -0.5 m^3/s, Q_3 = -2.0 m^3/s $K = 10.67\, L\, C^{-1.85}\, D^{-4.87}$

First Trial:

Pipe	K	Q	$H = KQ^n$	H/Q	$\Delta Q = -\frac{\Sigma H_i}{\alpha \Sigma \left[\frac{H_i}{Q_i}\right]}$
1	749	1.5	1586.2	1057.5	
2	6476	- 0.5	-1796.5	3593.0	0.30
3	899	- 2.0	-3240.9	1620.5	
			Σ=-3451.2	Σ=6270.9	

Adjust Q in all the pipes:
Q1 = 1.5 + (0.30) = 1.80
Q2 = - 0.5 + (0.30) = - 0.20
Q3 = - 2.0 + (0.30) = -1.70

Second Trial:

Pipe	K	Q	$H = KQ^n$	H/Q	$\Delta Q = -\frac{\Sigma H_i}{\alpha \Sigma \left[\frac{H_i}{Q_i}\right]}$
1	749	1.80	2545.4	1416.1	
2	6476	- 0.20	-340.7	1682.2	0.02
3	899	- 1.70	-2405.9	1413.2	
			Σ=-201.2	Σ=4511.4	

2 (b)

(i) Total daily demand = 1800+4200+6600+7700+10700+4000 = 35,000 m^3/d

(ii) Qu = 35000/(12*3600) = 0.81 m^3/s

Time(hour)		Inflow	Draft	Deficiency	Cumulative
		(m^3)	(m^3)		Deficiency
from	to				
0	4		1800	1800	1800
4	8		4200	4200	**6000**
8	12	11666.67	6600	-5066.66	933
12	16	11666.67	7700	-3966.66	-3033
16	20	11666.67	10700	-966.66	**-4000**
20	24		4000	4000	0
	sum=	35000	35000		

(iii) From the above table:

Equalising+operational storage = 6000 + 4000 = 10,000 m^3

(iv) if the operating time is moved by 2hr, the maximum cumulative deficiency would increase to 6000+(6600/2) = 9300, while the minimum cumulative deficiency would increase to -4000/2 = -2000. Hence, the storage would increase to 9300+2000 = 11300 m^3

3

(a) Dosage = $6.87*10^6/16.2*10^6$= 0.424 mg/l

Chlorine demand = 0.424 – 0.19 = 0.234 mg/l

(b) (i) Kilograms of hypochlorite powder for 2.1% solution

$$= \frac{111l \times 1\ \text{kg/l} \times 2.1\%}{0.72} = 3.24\text{kg}/111l$$

(ii)

2.1% solution = 21,000 mg/l, thus the dilution rate for 53 mg/l

21000 mg/l / 53 mg/l = 396.2

(iii) Usage of 2.1% hypochlorite solution

36 543 l / 396.2 = 92.2 liters (Assume this is small volume)

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** EN3003

Course Title : Environmental Transport Processes

Tabulated By : She Qianhong

Question No	Answer
1a	3.125 × 10^10 s
1b	(i) 797.9 mg/m3 or 797.9 µg/L ; (ii) 0.01596 kg/s; (iii) 400 m; 7.2 m/h or 0.002 m/s
2a	1.59×10^(-7)/s or 5.02/yr
2b	0.0828mg/L or 82.8µg/L
2c	77.13%
2e	(i) 0.174/d (ii) 45,550 m or 45.6 km; 0.2 mg/L; 9.5 mg/L
3a	100 h; 3.01 mg/L
3b	118.4 h
4a	(i) 5000 L/kg; (ii) 2 x 10^(-4) mg/L (iv) 2.5 x 10–4 mg/L
5a	(i) 2.61 x 10^(-5) m/s; 1.3 x 10^(-4) s^(-1) (ii) 4004 m
5b	2.59 x 10^(-3) cm/s ; 4.14 x 10^(-3) s-1

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** EN3004

Course Title : Air Pollution Control Engineering

Tabulated By : Wang Rong

Question No	Answer
1	(b) C= 1252.7 ppm; V=1.9 m^3
2	(b) (i) $C_{(500,0,0)}$ = 28.48 μg/m^3 (ii) C=20.43 ppb
3	(b) C_{out}=1158.2 mg/m^3 > 70 mg/m^3 (c) Efficiency: > 94%
4	(c) NO_x emission = 16.4 kg/min

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** EN4102

Course Title : Membrane Water Reclamation Technology

Tabulated By : She Qianhong

Question No	Answer
2b	Equation 1 when Y = 0.5, Pf = Pc = 60 bar, E = 3.3 kWh/m3 ⍰ (60/nHPP – 60x0.5nERD)/(0.5x36) = 3.3 Equation 2 when Y = 0.4, Pf = Pc = 50 bar, E = 3.125 kWh/m3 ⍰ (50/nHPP – 50x0.6nERD)/(0.4x36) = 3.125 Solving Equation 1 and 2, nHPP = 0.694 and nERD = 0.9
2c	Stage 1 Qf1100 Qp145 Qc155 Y10.45 Cf12000.0 Cp167.6 Cc13636.4 Cb12818.2 Cm13381.8 Fcp1.2 Rint0.98 Stage 2 Qf255 Qp218.7 Qc236.3 Y20.34 Cf23636.4 Cp2109.8 Cc25509.6 Cb24573.0 Cm25487.6 Fcp1.2 Rint0.98 System Qf100
2b	(i) 25 LMH/bar (ii) 1238.9 LMH (or1250 LMH (iii) 738.75 LMH (or 750 LMH) (iv) 426.3 W/m^2 (or 434 W/m^2)
3c	2.7 × 1012 m^(-1); 1.44 × 1012 m^(-1) ; 0.18 × 1012 m^(-1)

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** EN4104

Course Title : Environmental Hydraulics

Tabulated By : ALaw

Question No	Answer
1	(a) 5.714e5 m3/yr; (b) 16.67 ug/L; (c) decrease
2	(a) 48.3 ug/L; (b) 60.0 ug/L; (c) 39.7 km centered at 3 km downstream of discharge.
3	
4	(b) (i) 0.59 m3/s, 1.77 m4/s2; (ii) 0.40m/s; (iii) 4.0

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** MT1004

Course Title : Introduction to meteorology and oceanography

Tabulated By : A/P Edmond Lo and Mr Jeremy Seow (PTL)

Question No	Answer
Q1	Ans to MCQ: A, D, A, A, C
Q2	-
Q3	-
Q4	-

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** MT2004

Course Title : Mathematics II for Maritime Studies

Tabulated By : Tuti Lim; Wang Zhiwei

Question No	Answer
1 (b)	P=399.11
2 (a)	35;48;56
4(a)	12
4(b)	81.20%

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** MT3006

Course Title : SHIP CHARTERING

Tabulated By : CAPT KH TAN

Question No	Answer
4 (b)	
	Laytime as allowed due cargo loaded = 7020.80 / 1200 = 5d 20h 25m
	Laytime commenced 12/1200 as Loading commenced ! (Time used b4 LT commence)
	**** Despatch = 2d 6h 25 m**
	*** DHDWTSBE (Despatch rate is half that of Dem , i.e. 3000/2 = 1500 usd)
	Despatch WTS payable to Charterers = 54.42/24 x 1500 USD
= 3401.04 USD	

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** MT4102

Course Title : Distribution & Warehousing

Tabulated By : TEO CHEE CHONG

Question No	Answer
1(a)(i)	251
1(a)(ii)	2,931
1(a)(iii)	$200,200
1(a)(iv)	$17,420
3(a)	79.1%

Numerical Answers to Exam Question

Academic Year : 2022-2023 **Semester :** 2 **Course Code :** MT4103

Course Title : Port Planning and Operations

Tabulated By : Benson Chiu

Question No	Answer
4a	66 blocks
4b	67 rmgs

Numerical Answers to Exam Question

Academic Year : 2022-23 **Semester :** 2 **Course Code :** SU2001

Course Title : URBAN PLANNING and DESIGN

Tabulated By : David Chew; Evan Gwee

Question No	Answer
2(b)	225043; 262614; 449890;-75110;-25504