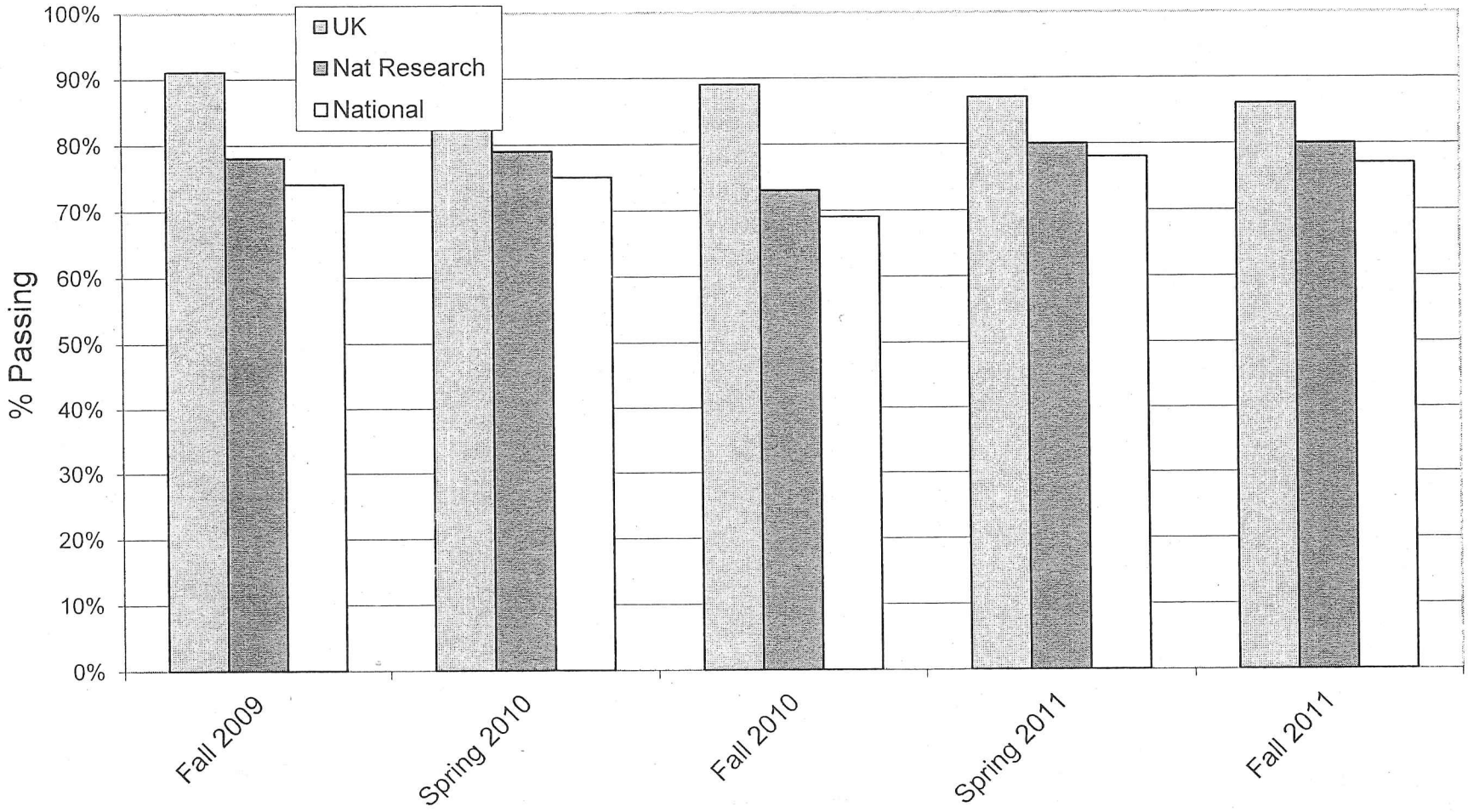
Civil only

Percent Passing Rates on the FE Exam for Currently Enrolled UK CE Students



Dr. Blandford - Structural Analysis

Blandford

FE Civil Engineering Exam Data

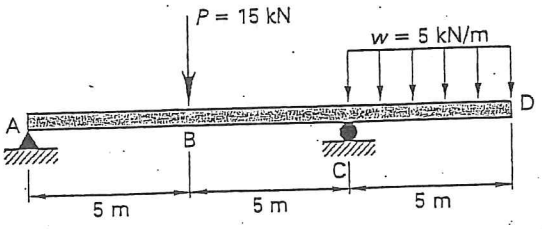
Currently Enrolled Students

		Fall 2011						Spring 2011				
	Exam	AVERAGE PERCENTAGES CORRECT						AVERAGE PERCENTAGES CORRECT				
AM Subject	Questions	UK	Res Inst	Nat	UK - Nat	Nat σ		UK	Res Inst	Nat	UK - Nat	Nat σ
Mathematics	19	63	60	61	2	3.1		68	66	66	2	3.2
Engr Prob & Stats	8	76	75	74	2	1.5		63	62	62	1	1.6
Chemistry	11	69	60	59	10	2.0		66	64	64	2	1.9
Computers	8	63	63	64	-1	1.5		67	70	70	-3	1.5
Ethics & Bus Prac	8	82	83	82	0	1.2		76	76	75	1	1.3
Engr Econ	10	60	64	63	-3	2.0		66	64	63	3	1.9
Mech - Statics	8	61	69	68	-7	1.6		61	58	57	4	2.0
Mech - Dynamics	5	53	56	56	-3	1.2		61	62	62	-1	1.2
Strength Materials	8	55	60	59	-4	1.8		59	61	60	-1	1.8
Material Properties	8	52	55	55	-3	1.6		48	51	51	-3	1.5
Fluid Mechanics	8	62	60	61	1	1.9		59	61	61	-2	2.0
Elec & Magnetism	11	34	40	42	-8	2.2		43	45	45	-2	2.4
Thermodynamics	8	54	48	47	7	1.7		39	42	42	-3	1.7
PM Subject												
Surveying	7	72	68	67	5	1.4		63	60	59	4	1.4
Hydraulics & Hydrol	7	58	62	60	-2	1.5		62	62	61	1	1.4
Soil Mech and Found	9	73	67	66	7	1.8		61	60	59	2	1.7
Environmental Engr	7	44	46	46	-2	1.3		61	61	61	0	1.4
Transportation	7	66	57	57	9	1.5		49	52	51	-2	1.6
Struct Analysis	6	62	58	58	4	1.3		46	50	51	-5	1.5
Struct Design	6	39	50	50	-11	1.4		60	63	63	-3	1.3
Constr Management	6	73	69	67	6	1.2		72	67	65	7	1.3
Materials	5	71	66	64	7	1.1		76	63	62	14	1.1
Number of Enrolled Students		22	1264	4140				54	1730	5873		
% Pass - Enrolled Students		**86%**	**80%**	**77%**	**9%**			**87%**	**80%**	**78%**	**9%**	
Number of Graduate Examinees		6	363	1529				6	328	1316		
% Pass - Graduates		**67%**	**48%**	**47%**	**20%**			**83%**	**49%**	**45%**	**38%**	

Blandford

Problems 31 and 32 are based on the following information and illustration.

A beam is loaded as shown.



Superposition

Simply Supported Beam +

31. The magnitude of the maximum bending moment in the beam is most nearly

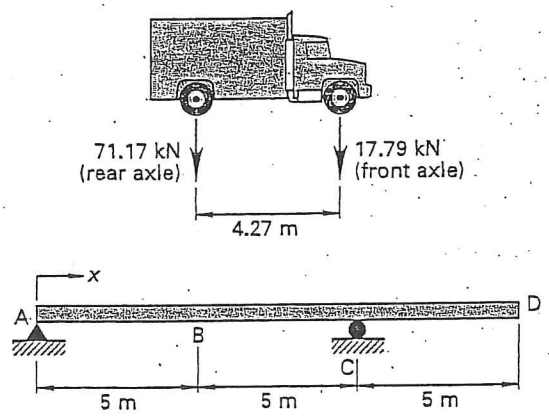
(A) 6.3 kN·m
(B) 14 kN·m
(C) 25 kN·m
(D) 63 kN·m

32. If the beam is made entirely of steel and the whole beam has a moment of inertia about the axis of bending of 2.0×10^8 mm^4, the magnitude of the vertical deflection at point D is most nearly

(A) 0.2 mm
(B) 2.3 mm
(C) 23 mm
(D) 50 mm

Problems 33 and 34 are based on the following information and illustration.

A truck is facing in its intended direction of travel along the beam as shown.



33. For a truck traveling in the direction shown, the magnitude of maximum vertical live load shear at support C is most nearly

for CA

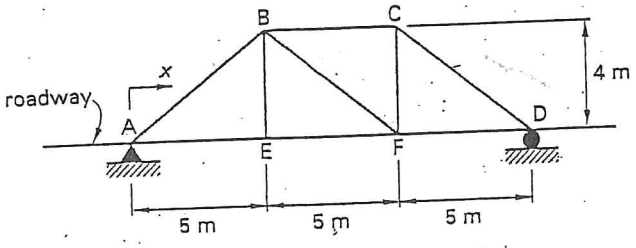
(A) 27 kN
(B) 76 kN
(C) 103 kN
(D) 107 kN

34. For a truck traveling in the direction shown, the magnitude of maximum live load bending moment at support C is most nearly

(A) 80 kN·m
(B) 90 kN·m
(C) 140 kN·m
(D) 360 kN·m

Problems 35 and 36 are based on the following information and illustration.

A plane truss span is shown. The roadway behaves as simply supported beam spans between the supporting lower chord truss joints. By convention, positive forces are tensile forces, and negative forces are compressive forces.



35. In the x-direction as shown, the maximum influence line ordinate for tensile force in member BF is most nearly

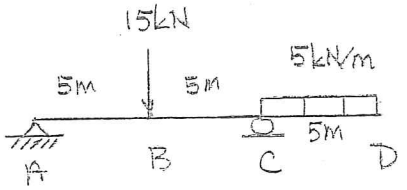
(A) 0.18 kN/kN
(B) 0.36 kN/kN
(C) 0.53 kN/kN
(D) 0.71 kN/kN

36. In the x-direction as shown, the maximum influence line ordinate for compressive force in member BF is most nearly

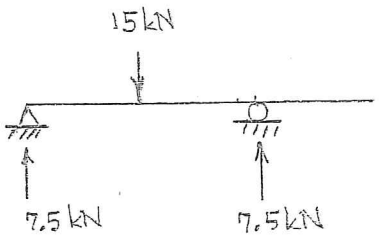
(A) −0.71 kN/kN
(B) −0.53 kN/kN
(C) −0.36 kN/kN
(D) −0.18 kN/kN

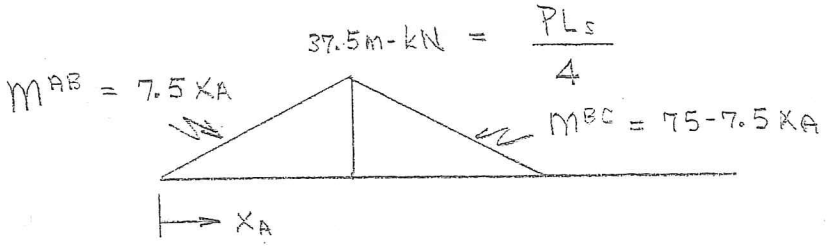
Practice Exam Problems

Problems 31 & 32

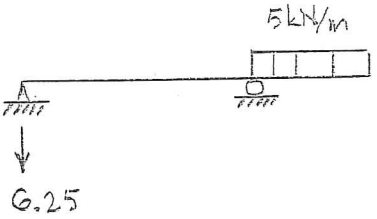


=

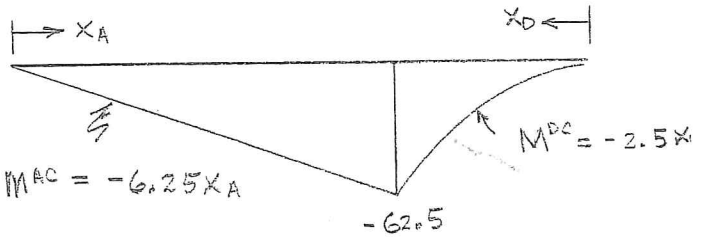




+

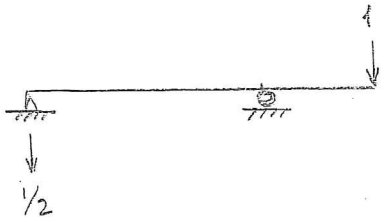


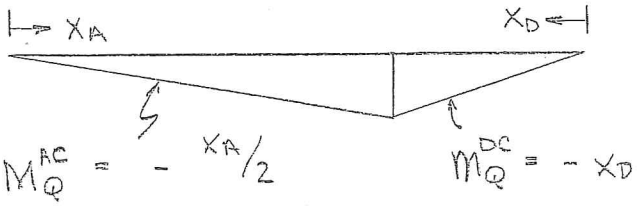
+



31. Answer (D)

32.





$E = 200\ kN/mm^2$

$I = 2 \times 10^8\ mm^4$

$$1 \cdot \delta_D = \int M_Q \frac{M_P}{EI}\, dx$$

$$= \frac{1}{EI}\left[\int_0^{10m} -\frac{X_A}{2}\left(-6.25 X_A\right) dX_A + \int_0^5 -X_D\left(-2.5 X_B^2\right) dX_B \right.$$

$$\left. + \int_0^5 -\frac{X_A}{2}\left(7.5 X_A\right) dX_A + \int_5^{10} -\frac{X_A}{2}\left(75 - 7.5 X_A\right) dX \right.$$

$$\delta_D = \frac{1}{EI}\left[\left.\frac{6.25X_A^3}{6}\right|_0^{10} + \left.\frac{2.5X_D^4}{4}\right|_0^{5} - \left.\frac{7.5X_A^3}{6}\right|_0^{5} \left.\left(-\frac{75X_A^2}{4} + \frac{7.5X_A^3}{6}\right)\right|_5^{10}\right]$$

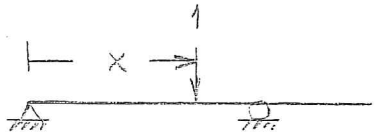
$$= \frac{1}{EI}\left(1041.667 + 390.625 - 156.25 - 1875. + 1250 + 468.75 - 156.25\right) \times 10^9 \ \text{kN-mm}^3$$

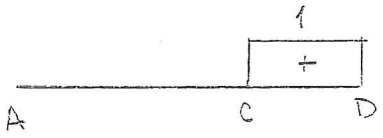
$$= \frac{963.542 \times 10^9 \ \text{kN-mm}^3}{200 \ (2\times 10^8)}$$

$$= 24.1 \ \text{mm}$$

Answer (C)

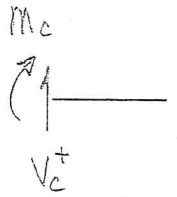
Problems 33 & 34





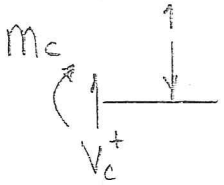
ILD for V_c^+

ILD for M_c



$V_c^+ = 0 \quad 0 \le x \le 10$

$M_c = 0 \quad 0 \le x \le 10$



$V_c^+ = 1 \quad 10 < x < 15$

$m_c^+ = -1(x-10)$

$= 10 - x \quad 10 < x < 15$

33. $(V_c^+)_{max} = 71.17 + 17.79 = 88.96$ kN

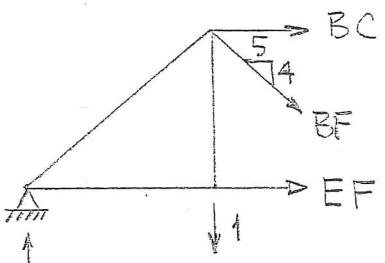
34. Place rear wheel at $x = 15$ m

$M_c = -5(71.17)$

$= -355.85$ m-kN

Answer (D)

Problems 35 & 36



For $x = 5$ m:

$$+\uparrow \Sigma F_y = 0 = -V_{BF} + A_y - 1 \qquad A_y = 1 - \frac{x}{L_s} = 1 - \frac{x}{15}$$

$$\therefore V_{BF} = A_y - 1 = \left(1 - \frac{5}{15}\right) - 1 = -1/3$$

For $x = 10$ m:

$$\Sigma F_y = 0 = -V_{BF} + A_y$$

$$\therefore V_{BF} = A_y = 1 - \frac{10}{15} = 1/3$$

$$BF = \frac{\sqrt{41}}{4} V_{BF} \qquad \left(\frac{V}{L_V} = \frac{H}{L_H} = \frac{R}{L}\right)$$

35. Answer (C)

36. Answer (B)