King Saud University
College of Engineering
Civil Engineering Department

CE 417
Construction Equipment and Method
First Semester 1425-1426

FINAL EXAM
(Closed Book - 3 Hours)

Name:_____ Number:_____ Section:

Question 1. (15%)

A. In the following statements circle T if you think the statement is true or F if you think it is false.

T F 1 - According to OSHA safety regulations a worker is penalized for safety violation.

T F 2 - In public projects the winning contractor will be the one who submits a responsible and responsive bid.

T F 3 - Drawbar pull is the power available at the hitch of a wheel tractor operating under standard condition.

B- What are the types of bonds that the contractor should submit to the project owner (discuss two of them)?

C-List three characteristics of concrete that affected by the water/cement ratio of the concrete mix.

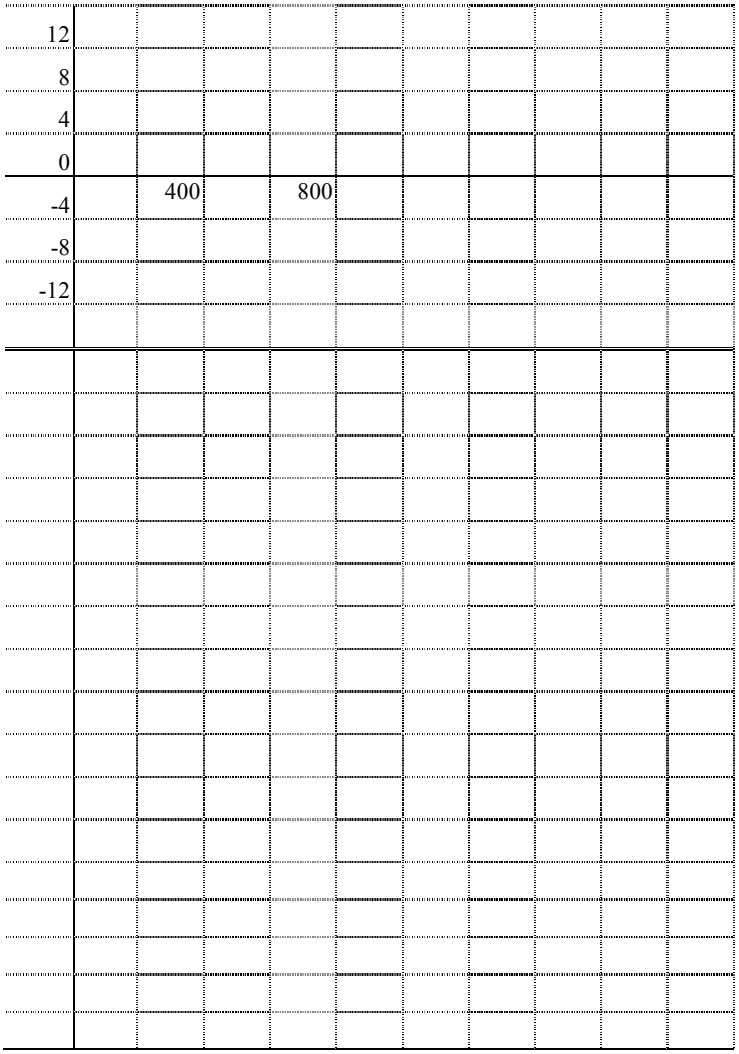
Question 2 (%)

Elevations of the normal ground with respect to a proposed highway are as follows:

Distance along centerline (m)	0	400	800	1200	1600	2000
Elevation (m)	0	-7	0	12	0	-5

Find the followings:

1. Draw the highway profile and the mass diagram.
2. The total volume of a. cut; b. fill; c. waste; and d. borrow.
3. The average length of haul in the balanced sections.



Question. (%)

You are given the following data for a scraper job: a. Number of scrapers are seven single-engine, overhung; b. Tandem pusher will be used; c. the scraper will carry 28 BCY (full load) ; d. Same route will be used for haul and return; e. Chain loading method (pusher cycle time is 0.9 min); f. Scraper fixed cycle time = 1.3 min.; g. Efficiency factor is 0.85 and job conditions are average. Sections of the haul route from the cut area to the fill area are as follows:

Section	Distance (ft)	Grade (%)	Rolling Resistance factor (lb/ton)	Eff. grade	Max. Speed	Average speed factor	Average speed	Travel time
1	500	-3.0	100					
2	3,000	-1.0	140					
3	1000	+1.0	180					
4	700	0	200					
Total travel time								

What is the estimated fleet production in bank cubic yards per hour?

Question 4 (%)

Find the expected hourly owning and operating cost for the third year of operation of the wheel tractor scraper described below:

Cost delivered = SR 450,000	Tax, insurance, and storage = 8%
Tire cost = SR 37,000	Load conditions = average
Estimated life = 5 years (2,000 hr/year)	Rated power = 415 hp.
Salvage value = SR 70,000	Fuel price = SR 3.6 /gal.
Depreciation method = double-declining balance method	Operator's wage = SR 25/hr
Interest rate = 10%	

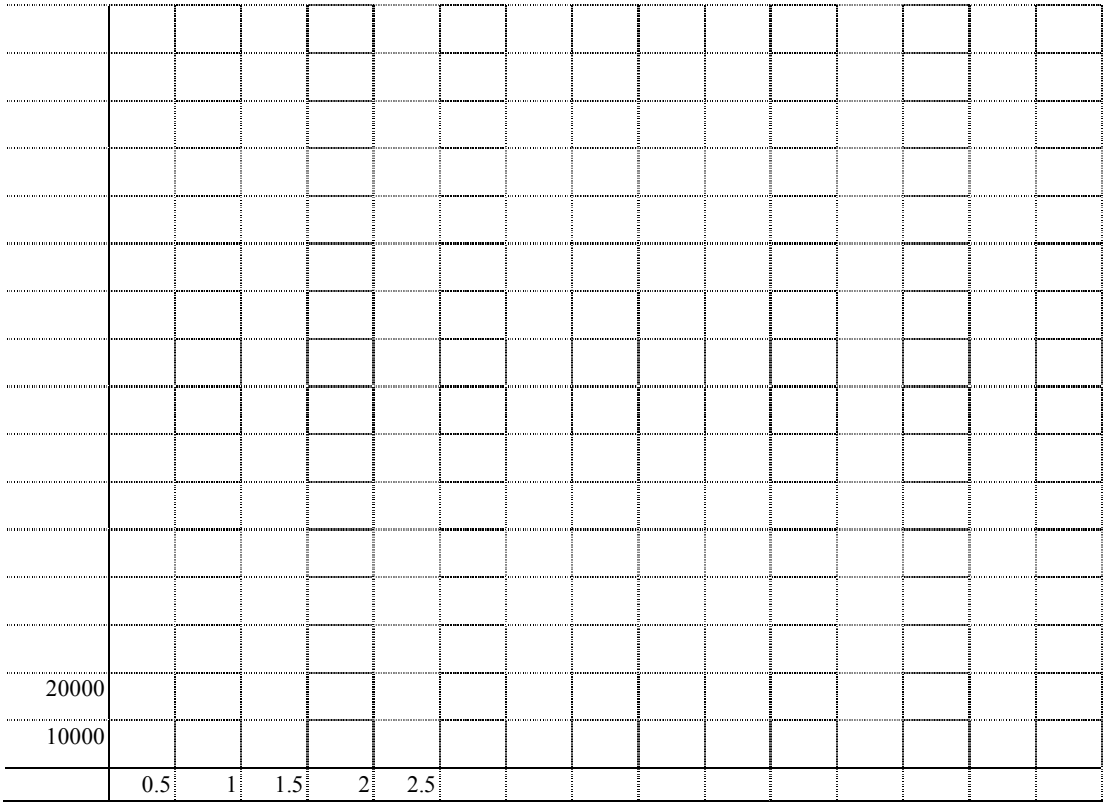
Question 5. (%)

Design a formwork for an elevated concrete floor slab 6.5 in. thick. Sheathing will be 1 in. (nominal)-thick lumber, while 2 x 8 in. lumber will be used for joists. Stringers will be 4 x 8 in lumber. Assume that all members are continuous over three or more spans. Commercial 4000-lb shores will be used. It is estimated that the weight of the formwork will be 5 lb/sq ft. Maximum deflection of form members will be limited to l / 360. Use the minimum value of live load permitted by ACI. Determine appropriate joist spacing, stringer spacing, and shore spacing.

Question 6 (%)

Financial data for a project are shown below. Plot the accumulated project expenditures, value of work, and progress payments received versus time. What is the contractor's maximum negative cash flow and when does it occur? Progress payments are calculated at the end of each month and received the middle of the following month. Retainage is 10% until project completion. Assume that final project payment, including released retainage, is received the middle of the month following project completion.

Month	End of month cumulative		Actual Receipt		
	Expenditure	Value of work			
1	SR 14000	SR 10500			
1.5					
2	34000	28000			
2.5					
3	58000	56000			
3.5					
4	86000	92000			
4.5					
5	126000	134000			
5.5					
6	132000	145000			
6.5					
7	140000	160000			
7.5					



Question
fuel consumption factor (gal/h/hp)= 0.035; service cost factor=33%; lifetime repair cost= 90%;
tire life=3300 hr

Question 5

nominal size	S4S	A	I	S
1 x 12	0.75x12	9		
2 x 8	1.5x7.25	10.875	47.635	13.141
4 x 8	3.5x7.25	25.375	111.148	30.661

	Sheathing	Other members
F_b	1075	1250
F_v	174	180
F_c		405
$F_{c\perp}$		850
E	1.36×10^6	1.4×10^6

Bending $l=4.46\ d\ ((F_b\ b) / w)^{1/2} = 10.95\ ((F_b\ S) / w)^{1/2}$
Shear $l= 13.3\ (F_v\ A / w) + 2d = 13.3\ (F_v\ bd / w) + 2d$
Deflection $l = 1.69\ (EI / w)^{1/3} = 1.69\ (Ebd^3 / 12w)^{1/3}$
Compression $F_{c\perp} = P/A$