

**National Exams Dec. 2005**

**98-Civ-B8, Management of Construction**

**3 hours duration**

**Notes:**

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made;
2. This is a "Closed Book" exam. Candidates may use one of two calculators, the Casio or the Sharp approved models;
3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked..
4. All questions are of equal value.

**1. Scheduling:**

The activity information of a small project is shown in the following table. Each activity requires the continuous use of a mechanical excavator throughout its duration. What will be the minimum contract duration if no more than two excavators can be made available for the work? It is assumed that when an activity is started, it must be completed without a break.

Activity	Duration (Weeks)	Depends On
A	1	----
B	2	A
C	2	A
D	3	A
E	4	B
F	5	C
G	4	D
H	1	C, E
I	3	G
J	1	F, H, I

**2. Estimating and Bidding:**

Consider a certain activity within your project. The quantity of this activity is 1400m<sup>2</sup>. Use the following data to estimate the construction cost and duration. It is noted that using local labor, the bare hourly rates for a worker and a helper are \$30 and \$25, respectively.

CREW	DAILY OUTPUT	LABOR HOURS	UNIT	BARE COSTS				TOTAL INCL O&P
				MAT.	LABOR	EQUIP.	TOTAL	
D-7	13.94	1.148	m <sup>2</sup>	48.5	27	---	75.5	93.50

The details of the crew D-7 are:

Crew no.	Bare costs		Incl. Subs O&P		Cost per labor-hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
1 Worker	\$26.10	\$208.80	\$38.60	\$308.80	\$23.55	\$34.83
1 Helper	\$21.00	168.00	31.05	248.40		
		\$376.80		\$557.20	\$23.55	\$34.83

**3. Labor Relations:**

Discuss the pros and cons of hiring unionized versus non-unionized labor for your construction project.

**4. Safety Practices and Regulations:**

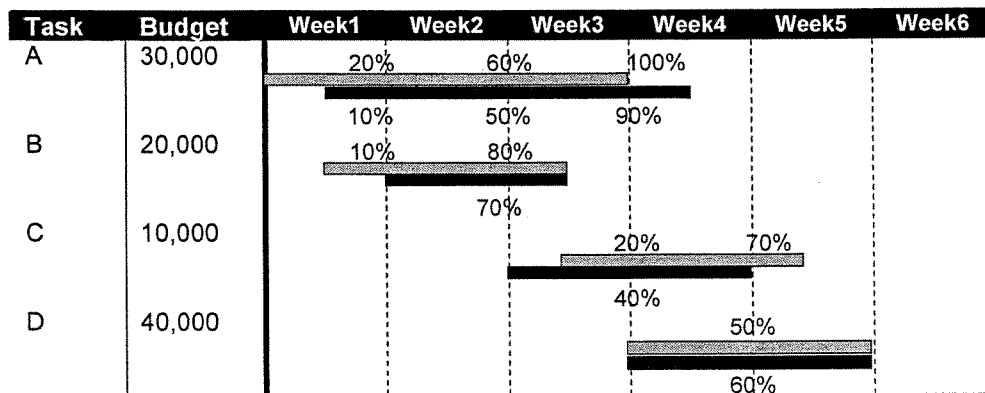
Discuss some of the safety practices that need to be adopted on the construction site of a multi-storey underground garage in a downtown location with adjacent buildings, to assure an accident-free environment.

**5. Engineering Economics:**

Annual maintenance costs for a particular section of highway pavement are \$2,500. The placement of a new surface would reduce the annual maintenance cost to \$650 per year for the first 5 years and to \$1,100 per year for the next five years. The annual maintenance after 10 years would again be \$2,500. If maintenance costs are the only saving, calculate the maximum investment that can be justified for the new surface, with interest at 5%.

**6. Project Control:**

Planned and actual bar charts for a small project are as follows:



▨ = Plan; and ▩ = Actual

- Draw the planned and the actual S-curves.
- Comment on the actual versus planned progress at end of week 3?
- By end of week 4, what is the total expenditures; compare this to the planned amount.