

**National Exams December 2013**

**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.

- a) Perform CPM analysis to determine project duration.
- b) If each activity requires the continuous use of a mechanical excavator throughout its duration. What will be the minimum project 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	3	---
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	2	F, H, I

**2. Litigation:**

Discuss the main reasons for delays and rework on construction projects. Also, discuss the various approaches by which a delay claim can be settled and the types of analyses that need to be performed to validate and judge such claims.

**3. Engineering Economics:**

An appraisal of two alternative projects is being carried out. Given the following cash flow, calculate the most economical plan using present value profit. Use discount rate of 10% per year.

	Project A	Project B
Initial Investment	\$60,000	\$50,000
Yearly operating cost	\$1,500	\$1,000
Major Maintenance (every 5 years)	\$5,000	\$3,500
Yearly revenue	\$12,500	\$16,000
Life	15 years	10 years

**4. Estimating and Bidding:**

Consider a certain activity within your project. The quantity of this activity is 1500m<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	
CR-7	13.94	1.148	m <sup>2</sup>	48.5	27	-----	75.5	93.50

The details of the crew CR-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

**5. Project Control:**

- (a) Briefly discuss the project's S-Curve and explain its shape.
- (b) Briefly discuss how the Earned Value approach is used to control the time, cost, and productivity of construction projects.

**6. Safety Practices and Regulations:**

Construction sites can be considered as being one of the most hazardous types of working environments. Discuss some of the important practices that need to be adopted on bridge rehabilitation work zones, particularly during night construction, to assure an accident-free environment.