National Exams May 2019

07-Str-B2, 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 (20 marks).

1. Scheduling:

The activities of a small project and their optional estimates are given below.

a) If all activities use their cheapest options, calculate project duration, cost, and required number of workers. Draw the network and show the critical pat; and

b) If you need to complete the project in only 8 days using only four workers/ day, determine the best combination of the given options. Calculate the associated project cost and draw a bar chart.

Activity	Depends on	Estimate 1- Slow Machine			Estimate 2 – Fast Machine		
		Cost ($)	Duration (days)	Workers / day	Cost ($)	Duration (days)	Workers / day
Site Preparation	---	$5,000	4.0	3.0	---	---	---
Trench 1 Excavation	1	$5,000	4.0	3.0	$10,000	2.0	2.0
Trench 2 Excavation	1	$5,000	4.0	2.0	$7,000	2.0	2.0
Lay Pipe 1 & Backfill	2	$5,000	4.0	3.0	$7,000	1.0	2.0
Lay Pipe 2 & Backfill	3	$5,000	4.0	3.0	$9,000	2.0	2.0

2. Litigation:

(a) Discuss the main reasons for delay-related claims on construction projects, the contractual modifications that can reduce such claims, and the types of analyses that need to be performed to validate and judge such claims.

(b) Briefly discuss the following: excusable versus non-excusable delays; compensable versus non-compensable delays; and concurrent versus non-concurrent delays.

3. Contract Administration:

Discuss the advantages and disadvantages of: Design-Bid-Build versus Construction Management at Risk delivery approaches. Also, discuss the criteria used by public agencies to filter out unbalanced bids and select a responsible winner.

4. 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	$170,000	$150,000
Yearly operating cost	$12,500	$11,000
Major Maintenance (every 5 years)	$15,000	$13,000
Yearly revenue	$23,500	$26,000
Life	15 years	10 years

5. Project Control:

In the bar chart below, the lighter bars indicate the actually time spent on each activity and the darker bars show planned durations. Activity C is still not finished. Assume that one day of work costs $1,000 per activity. Use the earned value method and the 20/80 rule to compute the Cost Performance Index (CPI) for the activities and for the project.
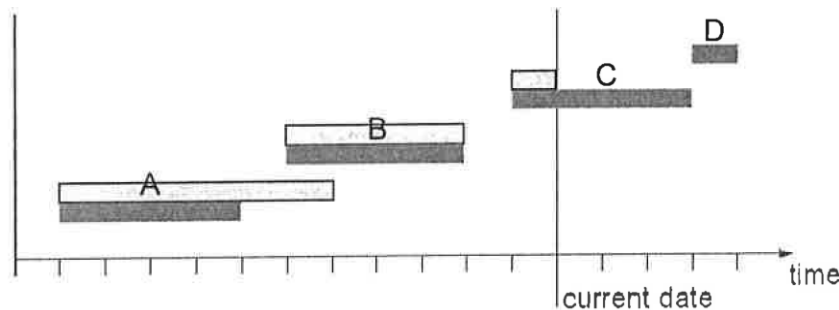
6. Safety Practices and Regulations:

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 a construction site that involves several activities, including demolition as well as removal of hazardous materials to an offsite location.