National Exams December 2019

16-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:

(a) Consider a PERT network for a project involving six tasks (A to F), as follows:

Task	Predecessor	Expected task duration (days)	Duration variance (days^2)
A	---	30	25
B	A	40	64
C	A	60	81
D	B	25	9
E	B, C	45	36
F	D, E	20	9

Determine the expected completion time of the project.

(b) For the project network shown, identify the critical path and calculate activities' total floats. What is the effect of delaying activity H by 6 days on project duration?
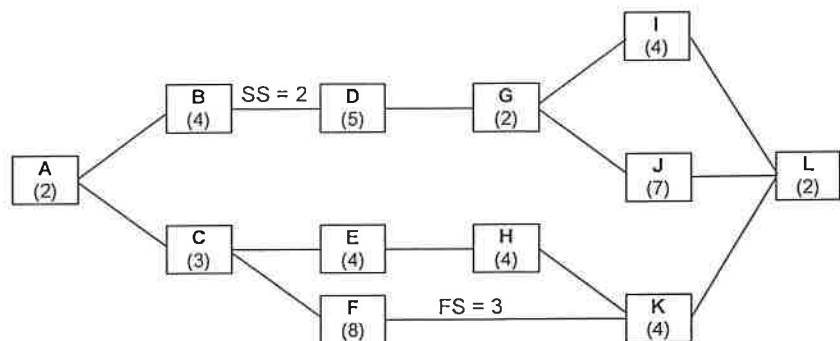
2. Litigation:

Briefly discuss the following:
- Difference between excusable and non-excusable delays;
- Difference between compensable and non-compensable delays;
- Difference between concurrent and non-concurrent delays.
- Main reasons for delay-related claims on construction projects;
- The contractual modifications that can reduce claims; and
- The types of analyses that need to be performed to validate/judge claims.

3. Contract Administration:

It is important to show fairness to contractors tendering for building projects. Assuming a traditional competitive bidding contract, discuss methods for the owner in demonstrating fairness: a) Prior to tendering; b): During the tender period; and c) during post tender evaluation. Also, discuss the criteria used to filter out unbalanced bids and select a responsible winner.

4. Engineering Economics:

We have three alternative highway improvements to consider, as shown below with all the yearly savings and costs. All will last for 20 years. Which option should we choose to invest in? Use discount rate of 10% per year.

Option	Initial Cost	Yearly Cost Savings			Maintenance Cost/year
		Less Accidents	Travel Time	Operation	
1	$185,000	$5,000	$3,000	$500	$1,500
2	$220,000	$5,000	$6,500	$500	$2,500
3	$310,000	$7,000	$6,000	$2,800	$3,000

5. Estimating:

The brickwork on the front face and one side of a house has the dimensions illustrated in the drawing. Perform quantity take-off and duration estimation using three types of bricks: Standard, King, and Jumbo. The bricklaying crew would be four brick masons and two laborers. The average production rates and the brick quantities per square foot of wall surface area (includes factor for waste) are shown the following table. Ignore the openings in the walls.
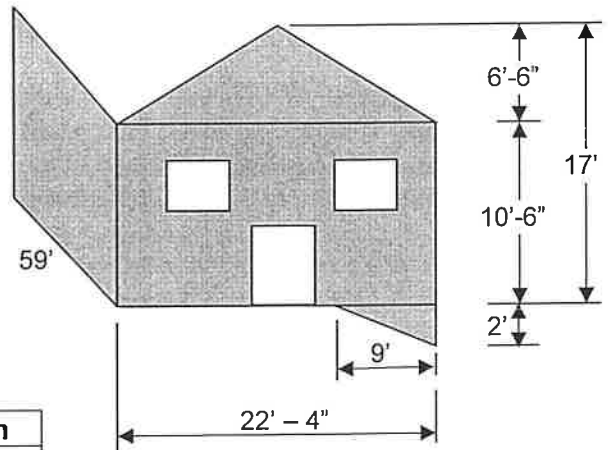
Brick quantity / SF	Production per brick mason
Standard 7.4 / SF	Standard 400 bricks / day
King 5.7 / SF	King 385 bricks / day
Jumbo 3.3 / SF	Jumbo 360 bricks / day

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 of a multi-lane bridge project that needs to be operational during construction.