

07-Bld-A3 Construction Engineering

National Exams May 2012

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any questions, the candidate is required to submit with the answer paper, a clear statement of any assumptions made;
2. This is a **CLOSED BOOK EXAM**. A Casio or Sharp approved calculator is permitted;
3. This paper has **SEVEN** questions. Answer any **FIVE** questions, which constitute the paper.
4. All questions carry equal marks;
5. For essay questions, clarity and organization of the answers are important.

Question 1:

A) Explain the main difference between planning and scheduling and give one example of each? (10 marks)

B) The planning process involves three steps of plan, schedule and control. Describe the requirements for each step and list the scope, work breakdown schedule, milestone placement, and monitoring of actual versus planned budget accordingly within each process? (10 marks)

Question 2:

Read the following case and then answer the questions related to it.

Mr. Sam Watson has recently been appointed as the project manager for a new project for his company. The project scope is to produce a complete renovation from a factory to a school. Renovating schools are extremely price-sensitive and all project managers are under a great deal of pressure to submit realistic budgets so that go/no go project decisions can be made quickly.

The Company recently fired a project manager for overestimating project costs at the feasibility stage of a similar renovating project. As a consequence, the project was cancelled at an early stage of its development only to find out that a competitor did win that project a few months later that proved to be very successful.

Sam's dilemma is how to construct a budget that accurately reflects the cost of the proposed renovation. Although he is an experienced project manager who feels comfortable with his estimating ability, the recent firing of his colleague has made him rather nervous. He has found that only one of the stages of the traditional four-stage renovating process needs to be changed completely. This will cause some minor changes to the other three stages, but it will represent almost 50% of the total renovating cost.

Under these circumstances, what budgeting approaches should Sam adopt and why? (20 marks)

Question 3:

A) What is the difference between arbitration and mediation? (5 Marks)

B) Can a contractor refuse to do change order work? Explain. (7 Marks)

C) Construction claims can end in litigation. Why is litigation viewed as the solution of last resort? (8 Marks)

Question 4:

For the following schedule, draw the node diagram, perform the CPM computations, mark the critical path, and complete the table. (20 marks)

ACTIVITY	DURATION	IPA	ES	EF	LS	LF	TF	FF
A	2							
B	5	A						
C	6	A						
D	6	B						
E	7	B						
F	4	B, C						
G	5	C						
H	10	D, E						
		F						
I	8	E, F, G						
J	7	D						
K	1	H, J						
		I						

Question 5:

Multiple Choices: Only one of the answers is the best for each question. (20 marks)

- (1) The square foot price obtained by using the Means national average data should be adjusted for which of the following?
 - a. Size of the facility and design fees;
 - b. Location of the project;
 - c. Time of the project;
 - d. All of the above.

- (2) The vapour retarder or barrier is placed between the gravel and the slab poured on it.
 - a. True;
 - b. False.

- (3) As the project proceeds, more information becomes available. As a consequence, the time required preparing the estimate ____, but the accuracy of the estimate _____.
 - a. Decreases, decreases;
 - b. Decreases, increases;
 - c. Increases, increases;

d. None of the above.

(4) Which of the following reasons is not a cause of a contract change?

- a. A change in owner requirements;
- b. Unforeseen conditions;
- c. Designer omissions or errors;
- d. Poor job site productivity.

(5) Concrete is measured by:

- a. The cubic yard;
- b. Square feet;
- c. Linear feet;
- d. None of the above.

(6) In the design of wall and column forms, the two most important factors are:

- a. Rate of placement of the concrete and the temperature of the concrete in the forms;
- b. Length of the wall or column and the temperature of the concrete in the forms;
- c. Length of the wall or column and the rate of placement of the concrete;
- d. None of the above.

(7) Crashing a project is the term used to describe:

- a. The process of accelerating an activity or multiple activities to shorten the overall duration of a project;
- b. The mismanagement of a project to failure;
- c. Aggressive bidding strategy to acquire a project;
- d. None of the above.

(8) The profit and overhead markup is used to cover the _____ and to provide _____ to the company.

- a. Job overhead, a profit;
- b. Home office overhead, a profit;
- c. Profit, direct overhead;
- d. None of the above.

(9) When deciding whether to increase the profit and overhead markup you need to take into account:

- a. The size of the project;
- b. Type of project;
- c. Bid date;

- d. All of the above.
- (10) Overhead costs are generally divided into home office overhead costs and job overhead costs.
- a. True;
 - b. False.
- (11) The most reliable productivity rates come from historical data.
- a. True;
 - b. False.
- (12) Exterior insulation finish system consists of a covered ___ with a ___.
- a. Rigid insulation layer, synthetic stucco system;
 - b. Spray-on insulation, synthetic stucco system;
 - c. Rigid insulation layer, layer of paint;
 - d. None of the above.
- (13) Errors in estimating can be reduced by:
- a. Listing all of the needed cost codes on a standardized form at the start of the estimating process;
 - b. Spending more time on the larger cost items;
 - c. Preparing more detailed estimates and double checking all takeoffs;
 - d. All of the above.
- (14) The total depreciation for any piece of equipment will be 100% of the ___ minus the ___ divided by the ___.
- a. Capital investment, salvage value, service life;
 - b. Operational cost, ownership costs, service life;
 - c. Capital investment, ownership costs, hours used/year;
 - d. None of the above.
- (15) Which of the following would not have an impact on the final bid price that a contractor submits?
- a. Market conditions;
 - b. Contractor exposure to a new market;
 - c. Contractor exposure to a new client;
 - d. All the above would have an impact on project cost.
 - e. None of the above.

- (16) The pricing of material unit cost is more difficult than the pricing of labour unit costs;
- True;
 - False.
- (17) Schedules are important management tools during which stage(s) of a project?
- Preconstruction;
 - Construction;
 - Postconstruction;
 - All of the above;
 - None of the above.
- (18) The budget baseline for a project is generally generated from the _____.
- Schedule;
 - Estimate;
 - A random guess;
 - Historical data.
- (19) Project float, if available, can be used to balance project resources;
- True;
 - False.
- (20) The time for completing a project is equal to the sum of the individual activity.
- True;
 - False.

Question 6:

(1) The required labour time for 2 technologists to complete a job is 8 hours total at a rate of \$19.50/hour. Assuming project overhead charges are 7.5% and allowance for personal time is 10%, calculate the total cost? (8 marks)

(2) Assuming that another project requires duration of 24 hours to complete, and the project is finished in 20 hours, identify the number of workers with the time spent by each on the project? Show your method and calculation by using the given formula of: $Work = Duration \times Units$. (7 marks)

(3) Suppose you want to crash the activity and need to complete the project in one working day. Using the same formula from above, show how this could be done without requiring overtime hours. (5 marks)

Question 7:

A contractor that specialize high-rise condominium in Ontario has been awarded a contract to construction a 20-story condominium with three lower level retails in a well built up area in Toronto. The contract is for two years with a fixed date for completion after which a \$100,000 per day penalty will apply. This is considered to be a major undertaking, is of strategic importance, and will require a matrix organization. The company has selected you as the Project Manager and a team to follow the project through to completion. You decide to employ a scheduling technique that should fulfill the following criteria: simple to follow; able to show the duration and sequence of events; able to indicate planned and actual flow; and able to show which items may proceed together and how far they are from completion. The Assistant Project Manager favors use of a Gantt chart, whereas the financial controller prefers PERT, and the Technology Department would like to use CPN.

Evaluate the techniques stated above (and any others that may be appropriate) and provide a persuasive argument for your choice of what should be used. (20 marks)