

Solutions to Civil Engineering Licensure Exam – Construction Equipment Management and Labor Productivity

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1 Multiple Choice Questions (MCQs)

1. **Which of the following factors most significantly affects labor productivity on a construction site?**

Solution: (a) Site accessibility and material availability.

Video Explanation: How To Improve Labor Productivity In Construction Industry

2. **The term 'equipment utilization' in construction refers to:**

Solution: (b) The percentage of time equipment is actively used on-site.

Video Explanation: EQUIPMENT PRODUCTIVITY — Construction Machinery Performance

3. **Which method is commonly used to estimate labor productivity in construction projects?**

Solution: (c) Work sampling and time studies.

Video Explanation: Module 1 - Construction Labor Productivity

4. **In construction management, 'crane cycle time' is best described as:**

Solution: (a) The time taken for a crane to complete one full cycle of lifting and returning.

Video Explanation: EQUIPMENT PRODUCTIVITY — Construction Machinery Performance

5. **Improving labor productivity can be achieved by:**

Solution: (d) All of the above (Providing proper training, Ensuring timely availability of materials, Implementing efficient site layouts).

Video Explanation: How To Improve Labor Productivity In Construction Industry

2 Problem-Solving

1. A construction project requires the excavation of 500 cubic meters of soil. If a backhoe has a bucket capacity of 1.5 cubic meters and an efficiency factor of 0.8, how many cycles are needed to complete the excavation?

Solution: The number of cycles N is calculated using the formula:

$$N = \frac{\text{Total Volume}}{\text{Bucket Capacity} \times \text{Efficiency Factor}}$$

Plugging in the values:

$$N = \frac{500 \text{ m}^3}{1.5 \text{ m}^3 \times 0.8} \approx 417 \text{ cycles}$$

Video Explanation: EQUIPMENT PRODUCTIVITY — Construction Machinery Performance

2. On a construction site, a team of workers installs 250 square meters of flooring in 5 days, working 8 hours each day. Calculate the labor productivity in square meters per hour.

Solution: Labor productivity P is calculated as:

$$P = \frac{\text{Total Area}}{\text{Total Time}} = \frac{250 \text{ m}^2}{5 \times 8 \text{ hours}} = \frac{250 \text{ m}^2}{40 \text{ hours}} = 6.25 \text{ m}^2/\text{hour}$$

Video Explanation: Module 1 - Construction Labor Productivity

3. A crane has a cycle time of 3 minutes per lift and operates with an efficiency of 75%. How many lifts can it perform in an 8-hour workday?

Solution: First, calculate the effective working time:

$$\text{Effective Time} = 8 \text{ hours} \times 60 \frac{\text{minutes}}{\text{hour}} \times 0.75 = 360 \text{ minutes}$$

Then, determine the number of lifts:

$$\text{Number of Lifts} = \frac{\text{Effective Time}}{\text{Cycle Time}} = \frac{360 \text{ minutes}}{3 \text{ minutes/lift}} = 120 \text{ lifts}$$

Video Explanation: EQUIPMENT PRODUCTIVITY — Construction Machinery Performance

4. A construction crew's productivity is observed to be 50 square meters of wall painted per hour. If the project requires painting 1,200 square meters, how many hours will the crew need to complete the task?

Solution: The time required T is calculated as:

$$T = \frac{\text{Total Area}}{\text{Productivity Rate}} = \frac{1200 \text{ m}^2}{50 \text{ m}^2/\text{hour}} = 24 \text{ hours}$$

Video Explanation: Module 1 - Construction Labor Productivity