

**National Exams December 2011**  
**04-For-A1, Forest Engineering Operations**

**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.  
No Calculators permitted.
3. Question 7 must be completed. Of the 6 remaining questions the examinee has the option of choosing 4 questions. FIVE (5) questions constitute a complete exam paper.

The first five questions as they appear in the answer book will be marked.

4. Each question is of equal value of 20 marks.
5. Questions require an answer in essay format. Clarity and organization of the answer are important.

1. Define: Harvest System. What kinds of harvest systems are common to Canadian Forest Industry? How is each system different from another? Give examples of equipment that work in each system, explaining the functionality of each machine (Use of an arc node diagram may help).
2. Productivity improvement has become a key business strategy for forest companies. Define process improvement, relate this to forest operations, justify why forest companies have focused on improving productivity and explain how forest operations are impacted.
3. With respect to harvest systems, does improving the productivity of one machine in a system, improve the productivity of the system? Explain why or why not. Use examples where appropriate to clearly illustrate your rationale.
4. Describe the difference between a full tree system and a short wood system. Define common machines found in each system. Explain the functions of each machine including limiting factors on productivity and output quality. Explain how the function of one machine can impact the productivity of subsequent machines following it in a system.
5. Understanding equipment costing is critical to the forest industry. Companies refer to the costing of equipment as a rental rate or proforma. Define rental-rate or proforma. Explain all relevant information required to calculate the cost to operate a machine (\$/pmh). Give examples where appropriate.
6. List and describe 4 techniques (technology or otherwise) forest companies have used to reduce their wood cost (process improvement, productivity improvement, multistage, etc). These improvements can relate to any aspect of forest operations (harvesting or trucking) but must be thoroughly explained.
7. Contractor earnings are critical to ensure all operating costs and expenses are covered. Given the following formula to calculate earnings:

$$\text{Volume (Production)} * \text{Rate (\$/volume)} * \text{Productivity (volume/pmh)} * \text{Utilization}$$

Define each part of the formula and explain how each are calculated or recorded, indicate how a positive or negative relationship impacts earnings (e.g. productivity goes up or down).

#### Marking Scheme

All questions have equal weight. All question components are weighted equally.