

# Professional Foresters Registration Examination

April 13, 2007

Part I

*Applicant Must Answer Question I - Short Answer*

Question I - Short Answer

*Applicant Must Also Answer Two of the Remaining Essay Questions in Part I*

Question II - Forest Mensuration

Question III - Forest Ecology

Question IV - Forest Economics

Question V - Forest Protection

Professional Foresters Registration

1416 9th Street, Room 1506-16

Sacramento, CA 9581

**You MUST answer this Question to pass the examination.**  
**Answer on these pages, tear from the booklet and submit with the answer packet**

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**QUESTION I - SHORT ANSWER**

3% 1. According to the California Forest Practice Rules (FPR) how would you define hard frozen conditions when hauling can occur during the winter period?

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2% 2. According to the FPR, harvests conducted to modify or guide the development of an existing stand of trees, but not to replace (regenerate) the stand with a new one are called

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4% 3. List two types of fixed costs and two types of variable costs generally associated with harvesting equipment.

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4% 4. A rectangular piece of land measures 40.2 chains by 78.5 chains. How many acres are in this piece of property?

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4% 5. In performing a Stocking Survey for a plantation area, you lay out a uniform grid as prescribed and sample 80 plots. What would be the minimum number of stocked plots needed to find the area in a stocked status, according to the FPR?

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2% 6. Hydric (or hygric) is a term pertaining to a wet or moist climate. The term pertaining to an environment THAT is dry or has little moisture is \_\_\_\_\_ and the term pertaining to an environment with a moderate supply of moisture is \_\_\_\_\_.

2% 7. When an alien or exotic species can establish, grow, reproduce, and maintain itself in an area where it did not originally grow, it is said to be \_\_\_\_\_.

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2%      8. If one subtracts the present value of costs from the present value of benefits, the residual is called \_\_\_\_\_.

2%      9. What California law requires forest practice regulations to address archeological resources?  
\_\_\_\_\_.

3%      10. A scale of 1: 6,000 translates to how many feet on the ground per inch on a map?  
\_\_\_\_\_.

3%      11. As applied to the growth of an even-aged stand of trees, what is the term for the point where the volumetric MAI is greater than zero and equal to the volumetric PAI?  
\_\_\_\_\_.

4%      12. List four (4) environmental or topographic settings that are common locations of prehistoric archeological resources found on California timberlands.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

2%      13. The difference between the greater volume actually sawn over the lesser estimated log scale volume is called \_\_\_\_\_.

3%      14. What is the "coefficient of variation" used to measure?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

3%      15. The Board of Forestry membership is appointed from three categories of representation. Briefly describe the basis upon which the Board members are selected .  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

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4%     16. *Armillaria mellea* (oak root rot) is endemic in California. What are two ways by which you can decrease the prevalence of this problem in a forest setting?

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3%     17. How do the Forest Practice Rules define "economic feasibility"?

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2%     18. A plant specified by law as being especially undesirable, troublesome and difficult to control is called a \_\_\_\_\_.

2%     19. Purposefully leaving a logging road reasonably impassable to standard production four wheel-drive highway vehicles, and leaving a logging road and landings, in a condition which provides for long-term functioning of erosion controls with little or no continuing maintenance is termed \_\_\_\_\_, under the Forest Practice Rules.

2%     20. A written analysis of pre-harvest and post-harvest timber stand conditions and a description of the silvicultural practices and systems to be used in lieu of the standard methods in a THP is termed a \_\_\_\_\_.

2%     21. The 1976 Forest Taxation Reform Act made what basic change in forest taxation?

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2%     22. Identify one certified specialty under the California Professional Foresters Law

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3%     23. List 3 of the genera in the family Fagaceae found in North America.

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2%     24. In the CCR, trees with well-developed crowns extending above the general level of the forest canopy and receiving full light from above and partly from the sides are termed \_\_\_\_\_.

3%     25. In a THP, you read a description of the areas as “a Class 6, multilayered trees with size class 5 trees over a distinct layer of size class 4 or 3 trees, with total tree canopy exceeding 60% closure.”. What type of classification system is this description taken from?

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3%     26. List three preventive, non-chemical, practices to control many forest insects, mites and diseases.

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2%     27. The distance from a landing to the farthest point in the cutting unit is called the \_\_\_\_\_.

2%     28. Scribner Decimal C log scale differs from Scribner log scale in what way?

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2%     29. For tax purposes, logging equipment is usually depreciated and timber is depleted. By what taxation process are the cost of roads recovered by the forest enterprise?

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3%     30. On a cable logging system, explain the purpose of the mainline.

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3%     31. Of the following California legislative acts having to do with forestry which came first, in chronological order: Forest Taxation Reform Act, Z'berg-Nejedly Forest Practice Act, Professional Foresters Law?

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3%     32. If a Public land Survey section has all normal measurements, how many acres are in the NE1/4 SW1/4 SE1/4?

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2%     33. An agreement between the U.S. Secretary of the Interior and either a private entity or a state, specifying the conservation measures that will be implemented in exchange for a permit that would allow the taking of a threatened or endangered species is called a

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3%     34. What is the difference between DBH, DOB, and DIB?

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3%     35. Define direct and indirect control of insects.

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2%     36. The process by which a landscape is broken into small islands of forest within a mosaic of other forms of landuse or ownership is known as

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Applicant #: \_\_\_\_\_  
Question #   I  

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- 2% 37. The process where a tree or other vegetation loses vigor and may die when growing space is not sufficient to provide photosynthetic energy or moisture to support adequate growth is called \_\_\_\_\_.
- 2% 38. A plant that is more or less restricted to moist sites, but not considered an aquatic plant is termed a \_\_\_\_\_.

**END OF QUESTION**

## QUESTION II- FOREST MENSURATION

### OBJECTIVE

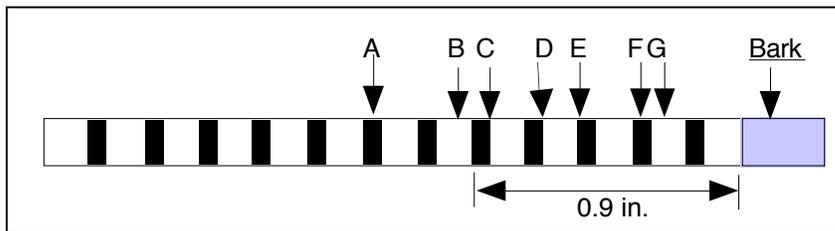
To demonstrate your knowledge of growth calculation and projection.

### SITUATION

In 2006 your client inherits 160 acres of Site II, well-stocked young growth forest. In 1996, the client's father selectively harvested 30 percent of the stand volume, obtaining most of the volume from trees 30-50 inches dbh. Five years later, he had a 10 percent cruise performed on the property. The cruise showed a total gross volume of 2,400 MBF and a total net volume of 2,040 MBF. The father's intent was to develop a maximum sustained yield management plan, but due to illness, his plans never progressed beyond the cruise. The client (his son) calls you and wants you to continue to prepare the sustained yield plan. You explain that you will have to bore some trees to obtain growth information. You meet on-site with the landowner in June of 2006.

### QUESTIONS

Using your increment borer, you extract the core illustrated below.



- 5% 1. How many years growth does the increment core represent?
2. Referring to the increment core:
- 2% a. Which letter(s) correspond to "spring or early" wood?

CONTINUED NEXT PAGE

2% b. Which letter(s) correspond to “summer or late” wood?

4% c. Between what two letters is one year’s total growth

10% 3. What is the 5-year radial increment of the core?

5% 4. When considering 10-year growth periods, what is a common basic assumption made about past growth period, relative to future growth period?

5% 5. The client asks the age of a 40-inch DBH tree. Your borer is only 10 inches long. List and briefly discuss five variables that you would consider in extrapolating an answer for your client.

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- 5% 6. You use your D-tape to measure a tree that you bored to get the core shown above. The DBH is 17.8 inches. What is the expected DBH of this tree in ten years? Assume that bark thickness remains constant.
- 5% 7. Rounding all tree diameters to 2-inch DBH classes, what is the annual percentage growth of this tree being considered in Question 6? Use the Volume Table shown below.

DBH   Volume (Bd Ft)

14	100
16	200
18	290
20	340
22	460
24	580

- 10% 8. Does this percentage indicate a simple or compound growth rate? Explain your answer.

After taking increment cores from 49 additional representative trees, you determine that the average annual stand growth is actually 4.8 percent. You want to use this data to establish an allowable harvest based on POI (percent of inventory).

- 10% 9. Based on POI, what is the total property annual net volume allowable cut?
- 10% 10. What is the annual per acre net growth?

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5% 11. At what per cent of maximum sustained production is the current stand growing? Use the table below for your calculation.

<u>Site</u>	<u>Max. Sustained Production</u> (bf/acre/year)
I	1100
II	850
III	600
IV	300
V	100

12. Assuming the same annual growth rate of 4.8 percent,

10% a. what is the minimum volume per acre inventory required to achieve maximum sustained production?

5% b. on a per acre basis, how much will the present stand have to grow to achieve maximum sustained production?

The landowner needs to generate a small amount of income in the next decade, but still wants his timber stand to ultimately achieve maximum sustained production.

2% 13. If he cuts 500,000 bf in five years, will the time to achieve maximum sustained production be increased or decreased?

5% 14. What is the **simplest** way to increase standing inventory while still generating some timber revenue?

**END OF QUESTION**

### QUESTION III- FOREST ECOLOGY

#### OBJECTIVE:

Fisheries considerations have been at the forefront of Forest Practice Regulations in California since 1997 after the Federal Endangered Species Act listing of coho in 1996. An understanding of 1) stream and riparian habitat, 2) salmonid and other fish requirements and 3) the inter-relationships between these items has become an important part of a forester's knowledge base. The following questions are intended to determine your understanding of stream habitat and salmonids.

#### QUESTIONS:

- 25% 1. Many of the functional and structural attributes of stream habitat are created and maintained through interaction with riparian vegetation. Riparian areas constitute the interface between terrestrial and aquatic ecosystems, performing a number of functions that affect the quality of salmonid habitat. List the five MOST IMPORTANT ways riparian areas influence streams and consequently salmonid habitat. For each way you have listed, briefly explain how the stream habitat is influenced to the benefit of salmonids.
2. Pool to riffle ratios are one parameter which defines a stream's ability to support fish, especially salmonids.
- 5% A) Explain what is meant by pool to riffle ratio and how it is measured.
- 20% B) Define a favorable range of pool to riffle ratio for a stream that is a Class I stream with salmonids using it and explain why you think that your specified pool to riffle ratio (or range of values) is favorable to salmonids.
3. The National Marine Fisheries Service (NMFS) in its "1997 Aquatic Properly Functioning Condition Matrix" uses two definitions in describing salmonid ecosystems: "properly functioning conditions" and "fully functioning conditions".
- 15% A) What is the difference between the two terms?
- 10% B) Describe one problem in implementing the NMFS concept.
- 25% 4. Large Woody Debris (LWD) has been determined to be very important for salmonid habitat. List and briefly describe five effects of insufficient or reduced LWD in a stream.

**END OF QUESTION**

## QUESTION IV-FOREST ECONOMICS

### OBJECTIVE

To determine your ability, as an RPF, to sell timber from a THP for your client and derive the most economic benefit for the client.

### SITUATION

Assume that you are a forest consultant to a family with relatively large forest and ranch land holdings. Although a large portion of their property is timbered, they consider themselves ranchers and defer to your judgment on matters pertaining to the management of the forested lands. However, in order to live in their accustomed style, they desire to net at least \$1,500,000 from timber each year. Consequently, you normally offer whatever timber volumes are necessary to yield at least this amount, within the sustained yield capability of their ownership. The results to this year's sale offerings are given below:

<b>Species</b>	<b>Volume, MBF*</b>	<b>Mill #1 Bid, \$/MBF</b>	<b>Mill #2 Bid, \$/MBF</b>	<b>Mill #3 Bid, \$/MBF</b>
Ponderosa Pine	5,000	520	380	480
Sugar Pine	2,500	540	400	500
White Fir	1,000	300	260	240
Douglas-fir	1,000	320	280	260
Incense-cedar	500	100	800	180

\* All volumes in thousand board feet, net scale

These prices represent what the mills will pay for logs delivered to their yard. Payment is to be based upon net scale, not lump sum. You have talked to your contract logger and he has provided you with the following information: He will charge \$80/MBF to get the timber from stump-to-truck, and the hauler he plans to subcontract with charges \$1000 per day for the truck-and driver. The truck can carry an average 5 MBF per load and will be able to make one round trip per day to Mill #1, four round trips per day to Mill #2, and two round trips per day to Mill #3.

In addition, the private road to the logging area crosses property owned by Mill #1. You have negotiated a Right-of-Way fee of \$10/MBF, which will be waived if Mill #1 is the successful bidder.

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You have made it clear to all the bidders that you are under no obligation to sell to the highest bidder of any species or in the aggregate amount. You will make your decision to sell based on the greatest net return to the client. In the past, however, you have sold the year's timber offerings to one mill rather than to several mills.

**QUESTION** (Show all calculations)

- 15 % 1. What is the haul cost per MBF to each mill?
2. Assume that all of the timber will go to a single purchaser rather than send one species to one mill and another species elsewhere.
- 15 % a. Discuss 3 possible reasons why it may be desirable to sell the timber to just one purchaser.
- 25 % b. In order to maximize returns to the family, show by table and computations how you would determine to which of the three mills you would award the bid. (Use the given data as your basis for selling all timber to a single purchaser.)
- 15 % 3. Discuss some reasons why Mill #2 would bid \$800 per MBF for the incense cedar.
- 15% 4. Discuss how and why your decision may change if Mill #2 specified that they would only accept logs cut to Specialty lengths, i.e. 17 and 34 feet, while Mill #3 would take anything from 8 feet on up (scaled in two foot intervals).
- 15% 5. Discuss five additional costs, which the family has to pay before they could realize a true "net return" of \$1,500,000 from timber.

**END OF QUESTION**

## QUESTION V- FOREST PROTECTION

### OBJECTIVE

To determine your ability to assess forest health and to demonstrate knowledge of management alternatives available to California RPFs.

### QUESTION

30% 1. The definition of “dying” trees includes those trees “judged to be dead within one year by an RPF”. Briefly describe what methods are available to judge mortality, and briefly describe 6 features you would look for when trying to judge if a conifer will be dead within one year.

10% 2. How do hardwoods differ from conifers when trying to judge probability of mortality. What are some similarities?

40% 3. Name 8 possible “agents” that are NOT biological in nature which cause damage to conifers. Briefly describe one or more sources of the agent, type(s) of damage from each agent, and how serious the damage is likely to be (chance tree would die or recover, lasting effects.) See Example below.

**Example:**

Agent - cold temperatures (freezing)

Source(s) of agent - natural cold air drainage, temperature inversion, weather patterns (arctic air mass)

Type of damage - freezing and killing of new growth, older needles can be killed too, frost cracking, frost heaving of seedlings

Seriousness - a mature tree would usually survive, seedling that have been pushed out of the ground would generally die if much of the root is exposed. Reduction in growth corresponding to a reduction in foliage. Reduction in wood quality possible from frost cracks. Top kill can deform tree.

Confine the answers to the direct types of damage; do not take analysis out to secondary insect or pathogen attacks. However, do consider trees of different ages (seedlings to mature) and of different species in your responses.

20% 4. Briefly describe two actions that can be taken under the Forest Practice Rules that will generally allow for the harvesting of dead and dying trees to begin within two weeks of submission of paperwork. Include what RPF responsibilities exist, if any, in implementing these actions.

**END OF QUESTION**

**Professional Foresters Registration Examination**

**April 13, 2007**

**Part II**

**Applicant Must Also Answer Three Of The Remaining  
Five Essay Questions In Part II**

Question VI-Forest Engineering  
Question VII-Silviculture  
Question VIII-Forest Administration  
Question IX-Forest Policy  
Question X-Forest Management

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## QUESTION VI - FOREST ENGINEERING

### OBJECTIVE

To determine your **analytical and planning** ability relating to road management and legacy logging road location in watercourse and lake protection zones.

### SITUATION

You are faced with the alternative of whether to reconstruct a one-half mile segment of an existing road or to construct a new road upslope outside of the watercourse protection zone. This road will provide access for a logging operation in the near future and also provide access for continued, future timber operations.

The climate is temperate and can have storms that exceed 4 inches of precipitation within a 24-hour period in a 5-year return period.

The existing road was built in 1981 as a single lane spur with a nearly constant grade of 3% with insloped drainage using an inside ditch and culverts for cross-drains. It was built just outside the boundary of the watercourse protection zone prescribed at the time of construction.

This road has been blocked for the last 15 years by three sediment plugged cross-drains and resulting washouts. There is an additional washout where a tributary Class II stream crosses the one-half mile segment. (A new road would also, obviously, cross the tributary Class II stream upslope.) The road surface has become vegetated with native grass, forbs, and brush and is in a generally stable condition.

Slopes adjacent to the existing road range from 20 to 35 percent and increase to 40 percent or more within 100 feet upslope from the existing road surface. Soils in the area are 30 to 50 inch deep unconsolidated, coarse, non-cohesive soils developed from weathered granitic parent material.

### QUESTIONS

- 30% 1. Discuss both the beneficial and detrimental aspects of each road alternative. Give at least 3 factors to be considered under both the good and the bad. Feel free to discuss additional aspects and solutions that you may need to consider in reaching a decision.
- 15% 2. Describe any site condition(s) requiring special care in design or mitigation.
- 25% 3. List and briefly describe five (5) measures that you would include in your plans to mitigate potential environmental problems. Indicate whether the mitigation applies to the new road, the use of the old road, or both.
- 30% 4. Identify and justify the road option you would select. State the assumptions that lead to a logical and defensible selection. (Economic justification alone is not adequate.)

**END OF QUESTION**

## QUESTION VII-SILVICULTURE

### OBJECTIVE

To determine your knowledge of reforestation practices.

### QUESTION

Consider a forested area with which you are familiar to answer questions 1–3

- 15% 1. List and briefly describe three basic types of site preparation used prior to planting commercial forest plantations in California.
- 20% 2. List and briefly describe four (4) requirements for successfully planting bare-root tree stock. Consider the period from when the trees are eligible for lifting through planting.
- 15% 3. List three (3) advantages of using containerized tree planting-stock as opposed to bare-root stock. List three (3) disadvantages of container stock.

Use the following scenario to answer questions 4 - 6. You are utilizing even-age management and harvest techniques in the Sierra Nevada mountains. The elevations of the harvest units range from 5000 feet to 7000 feet with a variety of aspects and slopes. Soils are typically coarse decomposed granite with little organic component. Species are California red fir (*Abies magnifica*) and white fir (*Abies concolor*).

- 20% 4. Discuss what options and techniques you have to insure adequate natural or artificial regeneration on your tract including the benefits and limitations of each.

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20% 5. Discuss the following nursery tree seedling classifications, the circumstances in which they are utilized and why they would or would not be appropriate to use in your tract.

1 - 0  
2 - 0  
1 - 1  
2 - 1  
Plug +1

10% 6. What would be the limiting environmental variables to seedlings planted here and what seedling types grown in California would be most appropriate and why?

**END OF QUESTION**

## QUESTION VIII- FOREST ADMINISTRATION

### OBJECTIVE

To demonstrate your ability to integrate range and forest administration techniques on a single property.

### SITUATION

A rancher owns 2000 contiguous acres of forestland at 4,000 - 5,000 foot elevation that includes 200 acres of wet meadow and a Class II stream. She wishes to manage her property on a sustainable basis for regular income, optimize forage production and grazing opportunities (for possibly both cattle and sheep) in the timberland and meadows, and to provide suitable wildlife habitat (she is predominately interested in deer).

Choose **ONE** of the following forest types:

- A) Pacific slope mixed conifer
- B) westside Sierran conifer
- C) eastside Ponderosa and lodgepole pine

### QUESTIONS

- 10%      1. For the timber area and wet\_meadow area (combined), identify two trees or shrubs, two grasses and one forb that you would expect to find and which are important forage plants. Indicate the palatability of each plant you have listed (high, medium or low) and for what animal (cattle, sheep and/or deer) your evaluation of palatability is based on. (Common plant names will be sufficient)
- 10%      2. In terms of range management, briefly describe the difference between biomass and forage, and how you would estimate the total volume of forage production available. Clearly state your assumptions.

(CONTINUED NEXT PAGE)

3. Assume you are choosing between the classic Shelterwood or Seed Tree regeneration methods to manage timber stands and achieve the forage resources the owner desires.
- 15% A. Discuss what pretreatment forage conditions might be important
- 5% B. Contrast how the actual harvest methods may affect forage resources,
- 5% C. Discuss the effects of site preparation on forage resources, and
- 5% D. Discuss how effects of intermediate treatments for each of these methods will affect the forage resource in terms of forage composition and growth.
- 25% 4. List five potential benefits and five potential disadvantages of allowing grazing in plantation or regeneration sites. Generally describe how the owner could manage her livestock to enhance benefits and to minimize the disadvantages that you have listed.
- 25% 5. Many resources and/or site conditions on such a property are important for wildlife habitat and fisheries. Describe five ways the wildlife and fisheries resources can be negatively impacted by livestock use. Briefly describe what livestock and range management practices can be used to effectively manage these resources?

**END OF QUESTION**

## **QUESTION IX- FOREST POLICY**

### **OBJECTIVE**

To determine your knowledge of the laws and agencies a RPF must work with to facilitate timber operations in California.

### **SITUATION**

Assume that you have the responsibility for planning and supervising a harvesting operation on an area of privately owned forestland in California.

### **QUESTION**

- 20%     1. . Identify four separate **State** regulatory agencies with which you may have to work in preparing and administering your THP.
- 40%     2. List and briefly discuss the principal laws through which each of the State agencies (that you have listed in Question 1 above) have authority to impact forest practices.
- 40%     3. For the four agencies that you listed in Question 1, explain how each agency interacts and meets its regulatory obligation.

**END OF QUESTION**

## QUESTION X- FOREST MANAGEMENT

### OBJECTIVE:

Global Positioning Satellite technology (GPS) is a commonly used tool for today's natural resource professional. While it may appear simple to use, there are many complexities that must be understood if the expected standards of accuracy are to be obtained. This question is designed to assess your understanding of GPS technology and its place in forest management.

### QUESTIONS:

10% 1. What does the acronym GPS stand for? What US government agency owns and manages the system?

15% 2A. To determine a terrestrial three-dimensional position (3-D), how many satellites, at a minimum, must your GPS receiver reliably receive a signal from?

2B. Explain how the GPS receiver accomplishes this task and why the number of satellites you have specified above is necessary.

20% 3A. Define the term "Selective Ability" (SA), its purpose, how SA is achieved or implemented and its current status (as of the date of this examination).

3B. In addition discuss two other sources of positional error commonly experienced in GPS usage.

25% 4. Describe the process known as "Differentially Corrected GPS" (DGPS) and its affect on GPS positional data and results. Include in your description a discussion of real-time DGPS and post-survey DGPS.

20% 5. You wish to use a GPS unit to map a stand of timber. Describe the "type" of GPS unit you would need in terms of its capabilities, cost, and features . Be specific in your discussion.

10% 6. Briefly discuss **two** common problems that you may encounter in using GPS to map a timber stand under forest conditions found in California. For each problem you list, also include at least one technique (procedure, equipment use or additional equipment) that has a good chance of defeating or overcoming the problem.

**END OF QUESTION  
END OF EXAMINATION**