Applicant #_____

Professional Foresters Registration Examination October 9th, 2015

PART I

Instructions: APPLICANTS, PLEASE READ THESE INSTRUCTIONS CAREFULLY. You MAY complete PART I by doing ONE of the following two options:

A) Complete the Short Answer Section (Question 1) and Any Two (2) of the Essay Questions (Questions II through V)
Answer Question 1 on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

Question II - Forest Mensuration
Question III - Forest Ecology
Question IV-Silviculture
Question V - Forest Protection

OR

B) Complete Any Three of the Essay Questions (Questions II through V) and OMIT answering the Short Answer Question (Question I).

Question II - Forest Mensuration
Question III - Forest Ecology
Question IV-Silviculture
Question V - Forest Protection

Professional Foresters Registration
1416 9th Street, Room 1506-16
Sacramento, CA 95814

ACRONYMS AND ABBREVIATIONS USED IN THIS EXAMINATION

The following Acronyms and/or Abbreviations **may be used** in this examination. Technical abbreviations that should be known by a forester are NOT included here (e.g. DBH, MAI, MBF). You may remove this page for reference throughout this examination. **It need not be returned.**

Acronym or Abbreviation	Full Text
BLM	Bureau of Land Management, USDI
BOF	California State Board of Forestry and Fire Protection
CCR	California Code of Regulations
CAL FIRE	California Dept. of Forestry and Fire Protection
CDF&W	California Department of Fish and Wildlife
FPR	California Forest Practice Rules
PRC	California Public Resources Code
RPF	California Registered Professional Forester
THP	California Timber Harvest Plan
TPZ	California Timber Production Zone
USFS	United States Forest Service, USDA

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Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

OCTOBER 2015 RPF EXAMINATION
QUESTION I - SHORT ANSWERS

3% 1. 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:

_____

3% 2. You wish to thin a stand of trees to an average 20 ft x 20 ft square spacing. How many trees per acre would your thinned stand have on the average acre?

_____

4% 3. The California Forest Practice Rules (FPR) use five (5) Technical Addendums to convey certain procedures used to prepare Timber Harvest Plans. Briefly describe the topic of 4 of these Technical Addendums.

_____ _____

_____ _____

3% 4. 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% 5. 5. The Forest Practice Act states it is the Legislature's intent to regulate and use timberlands to assure what two results?

_____

_____

3% 6. What California law requires forest practice regulations to address archeological resources?

_____

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Applicant #_____

Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

3% 7**.** Describe the difference between the current annual increments and mean annual increment for a given tree?

_____

_____

_____

_____

3% 8. How do the Forest Practice Rules define "economic feasibility"?

_____

_____

_____

_____

3% 9. A cost that changes in response to the level of output is what type of cost?

_____

3% 10. What is the "coefficient of variation" used to measure?

_____

_____

4% 11. List four purposes a THP document serves during its life:

_____ _____

_____ _____

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Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

3% 12**.** Typically, riparian vegetation is more important as a source of energy "inputs" in the headwaters areas of California and other western U.S. rivers than towards the lower end. Briefly explain why.

_____

_____

_____

_____

3% 13**.** Define road abandonment according to the current definition in 14CCR 895.1.

_____

_____

_____

_____

3% 14. Briefly describe the function of a Critical Dip.

_____

_____

3% 15. Utilization of forest biomass for bioenergy can benefit the people of California in several ways. List three major benefits.

_____

_____

_____

CONTINUED NEXT PAGE

Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

2% 16. List four of the many terms are used to define "taking" under the Federal Endangered Species Act?

_____ _____

_____ _____

3% 17. Besides CO_2, name three (3) other naturally occurring “greenhouse gases” present in Earth’s atmosphere.

_____ _____

_____

3% 18. For THP planning purposes, how do the rules define an “Active Nest” of an Osprey when you have not seen an Osprey occupy the nest in the 3 months you have been doing THP fieldwork?

_____

_____

3% 19. Why does the concept of MAI not apply well to uneven- age stands?

_____

_____

3% 20. For northern California, list three salmonids that have been place on the Federally Threatened or Endangered list. Give **either** the common **or** scientific names. (Northern California is commonly defined as that geographic region north of the Tehachapi Mountains.)

_____ _____

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Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

3% 21. 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 CA forest practice rules?

_____

_____

3% 22. In a geomorphic feature formed by coalescing scars originating from landslide and processes caused by active stream erosion, the feature that is identified as the area beginning immediately adjacent to the stream channel below the first break in slope is termed

_____

3% 23. The FPRs require that RPFs who prepare plans shall consider the range of feasible silvicultural system, operating methods and procedures. How do the Forest Practice Rules define "feasible"?

_____

_____

_____

4% 24. Name four retention practices recommended for stand treatments to maintain options for spotted owls on timberlands in the Sierra Nevada?

_____ _____

_____ _____

4% 25. State two <u>silvicultural</u> reasons that reforestation surveys are done.

_____

_____

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Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

2% 26. Which of the following tree species are susceptible to white pine blister rust: Pinus monticola, Pinus ponderosae, Pinus sabiniana, Pinus lambertiana, Pinus attenuata, Pinus contorta?

_____ _____

_____ _____

3% 27. According to the CCRs, an approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the pre-harvest stand for integration into the post-harvest stand to achieve various ecological, social and geomorphic objectives is called:

_____.

3% 28. A 25-ton load of fresh wood chips is delivered to a biomass co-generation facility. The load of chips has moisture content of 45%. How many bone dry tons in the load of chips? Show your work.

_____

_____

3% 29. Using forest economics as the sole criteria to determine when a project or transaction is economically viable, what condition must be met?

_____

_____

_____

3% 30. Briefly describe the distinctions between effectiveness monitoring and implementation monitoring.

_____

_____

_____

_____

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Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.

3% 31. Define Carbon Sequestration.

_____

_____

4% 32. List two (2) types of **fixed costs** and two (2) types of **variable cost**s generally incurred by Licensed Timber Operators in harvesting operations

_____ _____

_____ _____

(END OF QUESTION)

QUESTION II FOREST MENSURATION

OBJECTIVE

To determine your understanding of various methods of predicting forest growth.

SITUATION

Your employer has requested your advice about obtaining forest growth information necessary for preparing a timber management plan. He is interested in putting the entire property under management for long term timber productivity.

The subject property is a contiguous block of 10,000 acres of mixed conifer timber on medium or better site. Most of the property contains timber of average uniformity, all-aged, medium stocking and with a good distribution of age classes. Some areas however, contain even-aged stands of young sawtimber. The block is adjacent to somewhat similar properties that have been managed for sustained yield for 20 years or more. The landowner is concerned about the cost of the project but is willing to spend enough money and allow enough time to develop the necessary information.

QUESTIONS

Briefly describe each of the traditional methods of obtaining growth data listed below and **discuss** the **appropriateness and limitations** of each to meet the landowner's stated objective for the described forest condition:

5% 1. General Observation

20% 2. Even-aged Yield Tables

25% 3. Stand Table Projection

25% 4. Permanent Growth Plots or Continuous Forest Inventory

25% 5. Computer Growth models

(END OF QUESTION)

QUESTION III FOREST ECOLOGY

OBJECTIVE: To demonstrate your understanding of the effects fire has on various aspects of the forest ecosystem.

SITUATION: California' forests and wildland vegetation have developed in close association with fire. Fire is also an important ecosystem component and tool for forest managers.

QUESTIONS:

1. What has been the impact of fire suppression on mixed conifer forests (assume no stand replacing wildfire), such as those found in the Sierra Nevada mountains of California with regard to:

5% A. Change in conifer species composition

5% B. Dead fuel loading trend and prognosis over the rotation of a managed stand

5% C. Within stand diversity of vascular plants

5% D. Wildlife diversity

2. **Briefly describe** a minimum of <u>three</u> fire adaptations for <u>each</u> of the <u>five</u> species listed below. If there are not three adaptations, affirmatively state this rather than leaving the impression your answer is partially complete

3% A. Ponderosa pine

3% B. coastal redwood

3% C. white fir (Abies concolor)

3% D. knobcone pine

3% E. green leaf manzanita

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3. Discuss what ecological impacts are associated with **spring** burning vs. **fall** burning, in California, on the following biological or environmental elements of the ecosystem.

5% A. Plant buds:

5% B. Shrubs, damage and mortality:

5% C. Tree root systems:

5% D. Air quality:

4. Some ecosystems experience soil water repellency (hydrophobicity) problems following fire.

20% A. Describe the **physics** involved in creating hydrophobicity and what generalized soil texture group is most prone to this problem. Using your physics discussion, **explain why** this soil texture group is most affected.

10% B. Describe what **fire**, **fuel** and **soil** conditions are most likely to cause a water-repellant zone in soils.

15% C. **Compare** and **contrast** the possible burning conditions and subsequent risk of formation of a hydrophobic layer in the burning of a chaparral ecosystem compared to a mixed-conifer ecosystem.

(END OF QUESTION)

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QUESTION IV FOREST SILVICULTURE

OBJECTIVE:

Demonstrate your ability to develop tree marking guides in a variety of stand and silviculture situations

SITUATION 1:

As a California RPF you have been assigned to develop a **Commercial thinning** tree marking guide for forest technicians to implement. The selected stands are a group of ~45 year old plantations on site II ground adjoining main ridgetops. All stands were biomass thinned from below ~15 years ago. Recent data shows each to be a healthy typical even aged single species stand stocked with ~200 ft. sq. basal area of merchantable trees with a quadratic mean diameter (QMD) of ~18".

QUESTIONS:

10% 1.a. Per FPRs, define **"Commercial thinning"**.

10% 1.b. Without asking for an exception, what is the minimum post-harvest stand stocking for **commercial thinning?**

10% 1.c. Define a **hierarchical (structured) tree marking guide.**

20% 1.d. Write an unambiguous tree marking guide to achieve your company's 120 sq. ft. per acre of basal area per acre post-harvest standard. **Explain** your rules.

SITUATION 2: As a California RPF you have been assigned to develop a **Shelterwood Preparatory Step** tree marking guide for forest technicians to implement. The selected areas consist of several even aged young growth stands on site I gentle ground adjoining Class I perennial WLPZ. All stands were commercially thinned from below ~15 years ago. Recent data shows each to be a healthy mixed species stand stocked with ~200 ft. sq. basal area per acre of merchantable trees with a QMD of ~18". Ponderosa pine, white fir, Douglas-fir, incense cedar, and California black oak are all present in every canopy class in roughly equal quantities. To comply with your company's Habitat Conservation Plan, every commercial tree species present in the pre-harvest stand, large snags and snag recruitment shall be present in the overstory post each timber harvest.

QUESTIONS:

10% 2.a. Per FPRs, define **Shelterwood Preparatory Step**.

10% 2.b. Without asking for an exception, what is the minimum post-harvest stand stocking for **Shelterwood Preparatory Step?**

30% 2.c. Write an unambiguous tree marking guide to achieve your company's 125 sq. ft. per acre of basal area per acre post-harvest standard. **Explain** your rules.

(END OF QUESTION)

QUESTION V FOREST PROTECTION

OBJECTIVE

To determine your ability to discriminate between the various critical fire behavior attributes of forest fuels and your ability to recognize the potential for various fuel combinations to drive wildfires.

SITUATION

One basic determinant of fire behavior is fuel. Fuel is the one determinant that the forester has the ability and, often, the obligation to manage.

QUESTION

Consider the following fuel characteristics:

25% 1. Physical properties (size, bulk density, etc.)
25% 2. Total fuel quantity (fuel loading)
25% 3. Fuel moisture
25% 4. Fuel arrangement and composition (give examples in particular vegetation-fuel types)

Discuss in detail **EACH** characteristic with respect to its effects on:

a. rate of fire spread
b. resistance to control
c. "spotting"

(END OF QUESTION)

Professional Foresters Registration Examination October 9th, 2015

Part II

Applicant Must Also Answer Three of the Remaining Five Essay Questions in Part II

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

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Question VI FOREST ENGINEERING

OBJECTIVE

To determine your ability to identify factors which are important in the planning of timber harvesting operations.

QUESTIONS

20% 1. When developing a primary road system that includes utilizing **EXISTING** roads, what are four (4) important questions should be considered?

30% 2. **List** and **explain** six (6) separate FACTORS which dictate what logging equipment and logging systems should be used on a harvesting operation.

50% 3. **List** and **describe** each of these four (4) BASIC yarding systems (high-lead, skyline, tractor, and helicopter) and explain the **advantages** and **disadvantages** of each as they relate to meeting current **environmental**, **economic** and **social** demands.

(END OF QUESTION)

QUESTION VII 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 that 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:

Species	Volume, MBF*	Mill #1 Bid, $/MBF	Mill #2 Bid, $/MBF	Mill#3 Bid, $/MBF
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. 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 charges $1000 per day for the truck-and driver. The truck can carry 5 MBF per load on the average 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.

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.

CONTINUED NEXT PAGE

QUESTIONS (Show all calculations)

15 % 1. What is the haul cost per MBF to each mill?

2. Assume that it is desirable that all of the timber go to a single purchaser rather than send one species to one mill and another species elsewhere.

15 % a. Discuss three (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 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 peeler 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 (5) 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)

Applicant #_____

QUESTION VIII- FOREST ADMINISTRATION

OBJECTIVE

To assess your knowledge of Forest Practice Rules and THP administration as they relate to water resources.

SITUATION

Compliance with requirements set forth in Forest Practice Rules and Timber Harvesting Plans has been claimed to be a major impediment to consistent achievement of Best Management Practices for protecting the quality and beneficial uses of water.

QUESTION

15% 1. Briefly describe the meaning of Best Management Practices and give a short description of their origin and relationship to the Forest Practice Rules.

15% 2. List three (3) primary "riparian" resources currently protected by Forest Practice Rules.

35% 3. List specific practices given in the Forest Practice Rules which might be considered as best management practices in the following categories:

a. Sediment production and movement (Name 8)
b. Wildlife habitat (Name 3)
c. Water temperature (Name 2)
d. Soil Compaction (Name 2)

35% 4. Discuss in depth what you can do as a RPF both on a specific THP and in general to help operators comply with THP requirements in order to more consistently achieve Best Management Practices. (Do not limit yourself to only “regulation” oriented activities)

(END OF QUESTION)

QUESTION IX- FOREST POLICY

OBJECTIVE

To determine your knowledge regarding options available through California state law and regulation to meet planning and environmental requirements for commercial forest management.

QUESTIONS

75% 1. Listed below are several State of California sanctioned methods of meeting planning and environmental requirements for commercial forest management. **Describe**, in **detail**, each of the three (3) methods. Include **type of ownership** to which the method is best suited, general administrative description, **major constraints**, and **relative cost**. Include a description of an ownership that would be suited to each.

Non-industrial timber management plans (NTMP)
Modified timber harvesting plan (MTHP)
Sustained yield plans (SYP)

25% 2. Describe the conceptual difference between the Timber Harvesting Plan (THP) process and the Program Timberland Environmental Impact Report/Program Timber Harvesting Plan (PTEIR/PTHP) process.

(END OF QUESTION)

QUESTION X FOREST MANAGEMENT

OBJECTIVE:

Demonstrate your ability to implement Group Selection Silviculture at the stand level.

SITUATION:

As a California RPF you have been assigned to develop a Group Selection harvest plan for a company owned Site Class II stand. Company policy seeks to maximize sawlog volume production with a target final crop tree size of ~28" DBH by maintaining stand densities within a range of 50% to 75% of normal stocking. Company biometricians have analyzed copious inventory data from sites similar to your assigned stand to project lifetime average crop tree radial growth rates of five rings per inch at these densities. Your company is committed to supplementing natural regeneration with planting stock as needed.

You have reviewed aerial photography for the 75 acre stand and found it to be situated on a 30% east facing slope. It has good road access below thus is operationally suited to ground skidding. The stand is traversed by two Class II watercourses. The aerial photographs reveal an irregularly stocked stand due in part to past harvest activities. All tree size classes are present up to desired crop tree size. Trees tend to be clumped at a fine scale mosaic (< 0.1 acre) into sapling, pole and sawtimber clumps. Densities in these clumps range from 25% to over 100% of normal stocking. There are also a few fine scale gaps created by past harvesting and pest complexes now occupied by shrubs.

QUESTIONS:

10% 1. Per FPRs, define Group Selection.

5% 2.a. Per FPRs, what is the maximum proportion of the harvested area that may be covered by new small group clearings?

5% 2.b. Per FPRs, what is the range in size of Group Selection regeneration clearings?

5% 2.c. Per FPRs, what are the preharvest tree marking rules for Group Selection?

5% 3. In the future, about how long will trees regenerated in your new regeneration Groups grow before they reach final crop tree size? Please show your work.

5% 4. Assuming your company plans on roughly 15 years between regeneration entries, about how many acres should be regenerated on average at each such entry? Show your calculations.

Continued on next page

20% 5.a. What silvicultural logic will you use to select the appropriate average regeneration group size?

20% 5.b. What operational considerations will you use to select the appropriate average regeneration group size?

20% 6. What methodology will you employ to locate the set of regeneration groups you will create with this harvest?

5% 7. How will you manage the stand matrix (area not placed in regeneration groups) at this entry?

(END OF QUESTION)

END OF EXAM