# Appendix-C Results on Post-training Questionnaires

## Post-training Questionnaires

**Course Name:** System Protection and Control

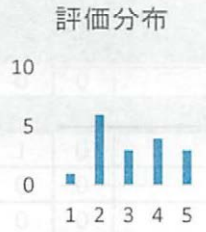
Condition of post training ⇔ A. Novelty of the training course contents

Q⇒ How much new knowledge for yourself were included in the subject?

(1) Overview of Electric Power System (Configuration and characteristics of each equipment)

| score | 1 | 2 | 3 | 4 | 5 | Score |
|---|---|---|---|---|---|---|
| Person 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 2 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 3 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 4 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 5 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 6 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 7 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 8 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 9 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 10 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 11 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 12 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 13 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 14 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 15 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 16 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 17 | 1 | 0 | 0 | 0 | 0 | 1 |
| Person 18 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 19 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 6 | 3 | 4 | 3 | |

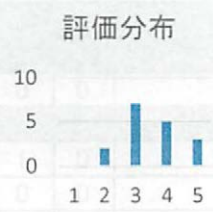
| | |
|---|---|
| total of P | 17 |
| sum of S | 53 |
| average | 3.117647 |
| STDEVP | 1.231085 |




(2) Overview of Protection Relay System (Configuration and objectives, type of relay, fail-safe system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 1 | 0 | 0 | 0 | 2 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 2 | 7 | 5 | 3 | |

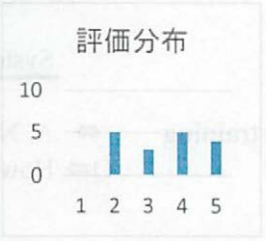
| | |
|---|---|
| total of P | 17 |
| sum of S | 60 |
| average | 3.529412 |
| STDEVP | 0.915079 |



(3) Neutral Grounding System (Type and purpose of each neutral grounding system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 1 | 0 | 0 | 0 | 2 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 5 | 3 | 5 | 4 | |

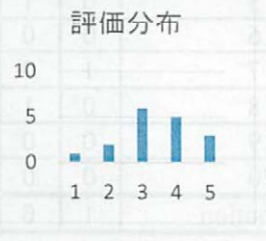
| | |
|---|---|
| total of P | 17 |
| sum of S | 59 |
| average | 3.470588 |
| STDEVP | 1.14366 |




(4-1) Transformer Protection System (Configuration and objectives of electrical relay and mechanical relay)

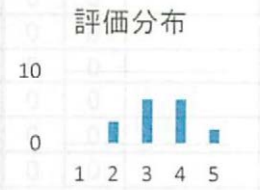
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 1 | 0 | 0 | 0 | 2 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 1 | 0 | 0 | 0 | 0 | 1 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 2 | 6 | 5 | 3 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 58 |
| average | 3.411765 |
| STDEVP | 1.087838 |



(4-2) Bus Protection System (Configuration and characteristics of system for each bus arrangement)

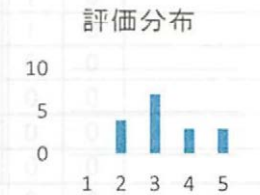
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 1 | 0 | 0 | 0 | 2 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 3 | 6 | 6 | 2 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 58 |
| average | 3.411765 |
| STDEVP | 0.91129 |

(5) Transmission Line Protection System (Type configuration and characteristics of each protection system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 1 | 0 | 0 | 0 | 2 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 4 | 7 | 3 | 3 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 56 |
| average | 3.294118 |
| STDEVP | 1.015452 |

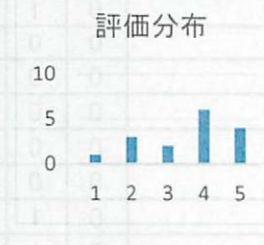
(6) Distribution Line Protection System (Type configuration and characteristics of each protection system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 1 | 0 | 0 | 0 | 2 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 4 | 4 | 6 | 3 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 59 |
| average | 3.470588 |
| STDEVP | 1.035695 |

(7) Fault Calculation

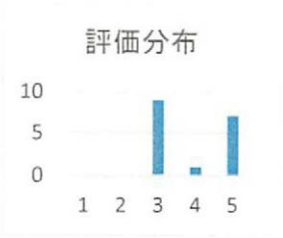
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 0 | 0 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 1 | 0 | 0 | 0 | 0 | 1 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 3 | 2 | 6 | 4 | |




| | |
|---|---|
| total of P | 16 |
| sum of S | 57 |
| average | 3.5625 |
| STDEVP | 1.223149 |

(8-1) Theory of Relay Setting

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 9 | 1 | 7 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 66 |
| average | 3.882353 |
| STDEVP | 0.962983 |

(8-2) Simulator Practice

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 1 | 7 | 2 | 7 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 66 |
| average | 3.882353 |
| STDEVP | 1.022244 |

## Post-training Questionnaires

**Course Name:** System Protection and Control

Effectiveness evaluation caused by training

⇔ B. Possibility of practical use of acquired knowledge

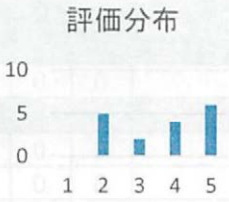
Q⇒ How frequently do you use acquired knowledge from the subject to improve quality of your current work?

| score | 1 | 2 | 3 | 4 | 5 | Score |
|---|---|---|---|---|---|---|

(1) Overview of Electric Power System (Configuration and characteristics of each equipment)

| | | | | | | |
|---|---|---|---|---|---|---|
| Person 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 2 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 3 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 4 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 5 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 6 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 7 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 8 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 9 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 10 | 0 | 1 | 0 | 0 | 0 | 2 |
| Person 11 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 12 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 13 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 14 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 15 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 16 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 17 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 18 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 19 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 5 | 2 | 4 | 6 | |

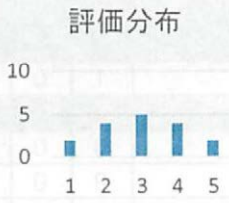
| | |
|---|---|
| total of P | 17 |
| sum of S | 62 |
| average | 3.6471 |
| STDEVP | 1.2339 |




(2) Overview of Protection Relay System (Configuration and objectives, type of relay, fail-safe system)

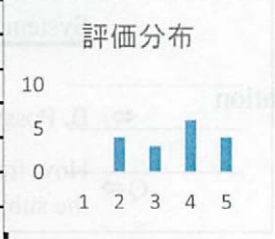
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 1 | 0 | 0 | 0 | 2 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 1 | 0 | 0 | 0 | 0 | 1 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 1 | 0 | 0 | 0 | 0 | 1 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 1 | 0 | 0 | 3 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 2 | 4 | 5 | 4 | 2 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 51 |
| average | 3 |
| STDEVP | 1.1882 |



(3) Neutral Grounding System (Type and purpose of each neutral grounding system)

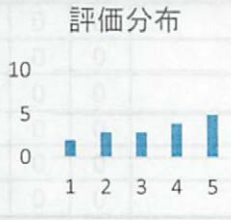
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 1 | 0 | 0 | 0 | 2 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 4 | 3 | 6 | 4 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 61 |
| average | 3.5882 |
| STDEVP | 1.0878 |

(4-1) Transformer Protection System (Configuration and objectives of electrical relay and mechanical re

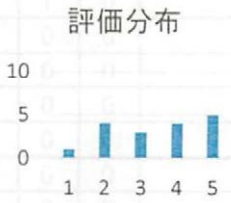
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 1 | 0 | 0 | 0 | 0 | 1 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 1 | 0 | 0 | 0 | 0 | 1 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 2 | 3 | 3 | 4 | 5 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 58 |
| average | 3.4118 |
| STDEVP | 1.3745 |

(4-2) Bus Protection System (Configuration and characteristics of system for each bus arrangement)

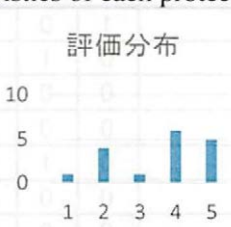
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 1 | 0 | 0 | 3 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 1 | 0 | 0 | 0 | 0 | 1 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 4 | 3 | 4 | 5 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 59 |
| average | 3.4706 |
| STDEVP | 1.2888 |

(5) Transmission Line Protection System (Type configuration and characteristics of each protection syst

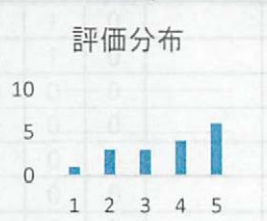
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 1 | 0 | 0 | 0 | 2 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 1 | 0 | 0 | 0 | 0 | 1 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 4 | 1 | 6 | 5 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 61 |
| average | 3.5882 |
| STDEVP | 1.2861 |

(6) Distribution Line Protection System (Type configuration and characteristics of each protection syste

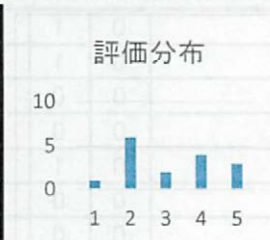
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 1 | 0 | 0 | 0 | 0 | 1 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 3 | 3 | 4 | 6 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 62 |
| average | 3.6471 |
| STDEVP | 1.2807 |

(7) Fault Calculation

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 1 | 0 | 0 | 0 | 0 | 1 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 0 | 0 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 1 | 0 | 0 | 0 | 2 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 1 | 0 | 0 | 0 | 2 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 1 | 0 | 0 | 0 | 2 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 1 | 0 | 0 | 3 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 6 | 2 | 4 | 3 | |

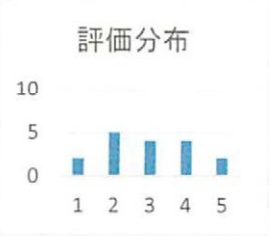



| | |
|---|---|
| total of P | 16 |
| sum of S | 50 |
| average | 3.125 |
| STDEVP | 1.2686 |

(8-1) Theory of Relay Setting

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 1 | 0 | 0 | 0 | 0 | 1 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 1 | 0 | 0 | 0 | 2 |
| P6 | 0 | 1 | 0 | 0 | 0 | 2 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 1 | 0 | 0 | 0 | 0 | 1 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 1 | 0 | 0 | 0 | 2 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 1 | 0 | 0 | 0 | 2 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 1 | 0 | 0 | 3 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 2 | 5 | 4 | 4 | 2 | |

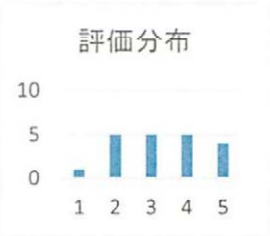
| | |
|---|---|
| total of P | 17 |
| sum of S | 50 |
| average | 2.9412 |
| STDEVP | 1.2113 |




(8-2) Simulator Practice

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 1 | 0 | 0 | 0 | 0 | 1 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 1 | 0 | 0 | 0 | 2 |
| P5 | 0 | 1 | 0 | 0 | 0 | 2 |
| P6 | 0 | 1 | 0 | 0 | 0 | 2 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 1 | 0 | 0 | 0 | 2 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 1 | 5 | 5 | 5 | 4 | |

| | |
|---|---|
| total of P | 20 |
| sum of S | 66 |
| average | 3.3 |
| STDEVP | 1.1874 |



## Post-training Questionnaires

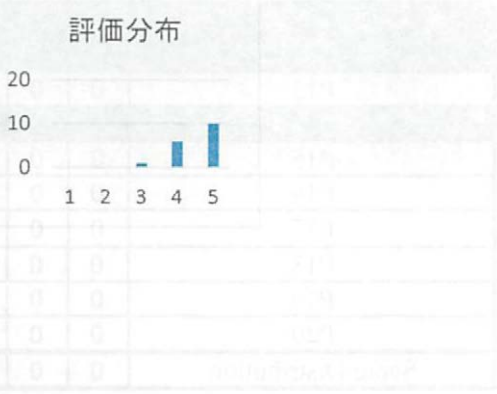
**Course Name:** System Protection and Control

Effectiveness evaluation caused by training ⇔ C. Technical utility in your future career

Q⇒ How effective do you think technical knowlege that was learnt from the subject in your future career?

(1) Overview of Electric Power System (Configuration and characteristics of each equipment)

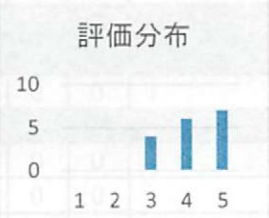
| score | 1 | 2 | 3 | 4 | 5 | Score |
|---|---|---|---|---|---|---|
| Person 1 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 2 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 3 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 4 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 5 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 6 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 7 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 8 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 9 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 10 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 11 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 12 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 13 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 14 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 15 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 16 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 17 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 18 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 19 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 6 | 10 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.529412 |
| STDEVP | 0.605625 |

(2) Overview of Protection Relay System (Configuration and objectives, type of relay, fail-safe syste

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 4 | 6 | 7 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 71 |
| average | 4.176471 |
| STDEVP | 0.784804 |

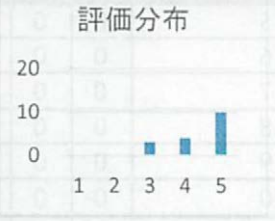
(3) Neutral Grounding System (Type and purpose of each neutral grounding system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 0 | 1 | 5 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 4 | 4 | 9 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 73 |
| average | 4.294118 |
| STDEVP | 0.823529 |

(4-1) Transformer Protection System (Configuration and objectives of electrical relay and mechanica

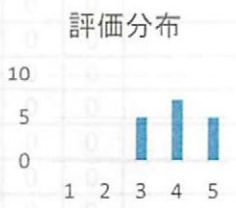
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 0 | 0 | 1 | 5 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 3 | 4 | 10 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 75 |
| average | 4.411765 |
| STDEVP | 0.771463 |

(4-2) Bus Protection System (Configuration and characteristics of system for each bus arrangement)

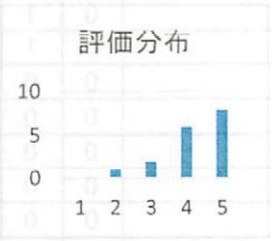
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 1 | 0 | 0 | 3 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 5 | 7 | 5 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 68 |
| average | 4 |
| STDEVP | 0.766965 |

(5) Transmission Line Protection System (Type configuration and characteristics of each protection s

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 1 | 2 | 6 | 8 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 72 |
| average | 4.235294 |
| STDEVP | 0.876451 |

(6) Distribution Line Protection System (Type configuration and characteristics of each protection sy

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 0 | 1 | 5 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 2 | 5 | 10 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 76 |
| average | 4.470588 |
| STDEVP | 0.696009 |

(7) Fault Calculation

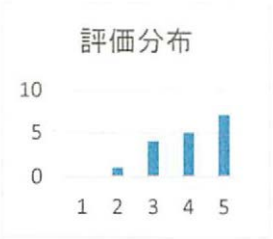
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 1 | 0 | 0 | 0 | 2 |
| P2 | 0 | 1 | 0 | 0 | 0 | 2 |
| P3 | 0 | 0 | 0 | 0 | 0 | 0 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 3 | 2 | 5 | 6 | |


| | |
|---|---|
| total of P | 16 |
| sum of S | 62 |
| average | 3.875 |
| STDEVP | 1.111024 |

(8-1) Theory of Relay Setting

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 1 | 4 | 5 | 7 | |

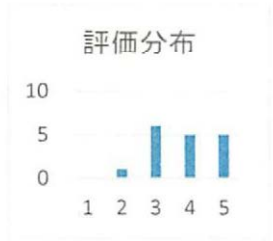
| | |
|---|---|
| total of P | 17 |
| sum of S | 69 |
| average | 4.058824 |
| STDEVP | 0.937493 |

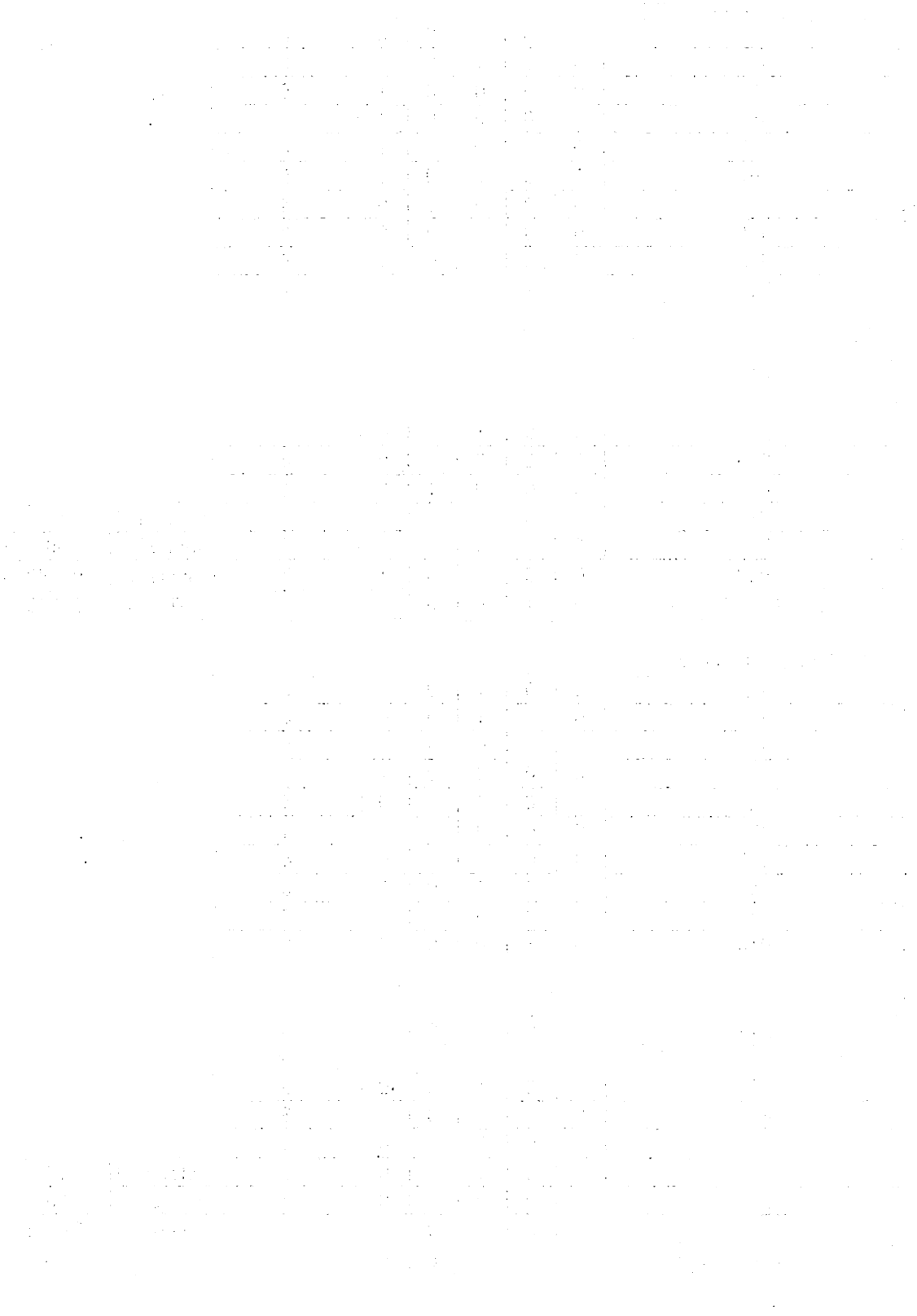



(8-2) Simulator Practice

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 0 | 0 | 1 | 5 |
| P10 | 0 | 1 | 0 | 0 | 0 | 2 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 1 | 6 | 5 | 5 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 65 |
| average | 3.823529 |
| STDEVP | 0.922611 |





## Post-training Questionnaires

**Course Name:** System Protection and Control

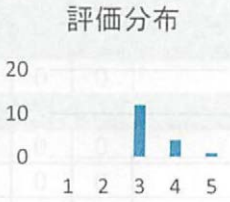
Effectiveness evaluation caused by training

⇔ D. Advanced level of technical content

Q⇒ How sophisticated is the level of the subject that compared with your current engineering capacity?

(1) Overview of Electric Power System (Configuration and characteristics of each equipment)

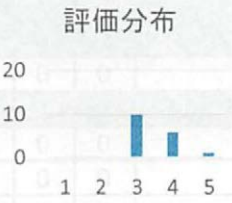
| Rank | 1 | 2 | 3 | 4 | 5 | Score |
|---|---|---|---|---|---|---|
| Person 1 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 3 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 4 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 5 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 6 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 7 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 8 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 9 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 10 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 11 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 12 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 13 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 14 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 15 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 16 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 17 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 18 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 19 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 20 | 0 | 0 | 0 | 1 | 0 | 4 |
| Score Distribution | 0 | 0 | 12 | 4 | 1 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 57 |
| average | 3.3529 |
| STDEVP | 0.5882 |

(2) Overview of Protection Relay System (Configuration and objectives, type of relay, fail-safe system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 1 | 0 | 0 | 3 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 1 | 0 | 0 | 3 |
| Score Distribution | 0 | 0 | 10 | 6 | 1 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 59 |
| average | 3.4706 |
| STDEVP | 0.6056 |

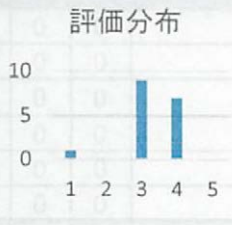
(3) Neutral Grounding System (Type and purpose of each neutral grounding system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 1 | 0 | 0 | 0 | 2 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 1 | 0 | 0 | 0 | 2 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 1 | 0 | 0 | 3 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 1 | 0 | 0 | 3 |
| Score Distribution | 0 | 2 | 8 | 6 | 1 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 57 |
| average | 3.3529 |
| STDEVP | 0.7624 |

(4-1) Transformer Protection System (Configuration and objectives of electrical relay and mechanical re

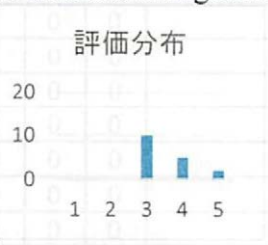
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 1 | 0 | 0 | 0 | 0 | 1 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 1 | 0 | 0 | 3 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 1 | 0 | 0 | 3 |
| Score Distribution | 1 | 0 | 9 | 7 | 0 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 56 |
| average | 3.2941 |
| STDEVP | 0.7487 |

(4-2) Bus Protection System (Configuration and characteristics of system for each bus arrangement)

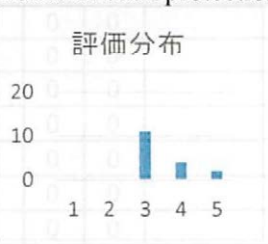
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 1 | 0 | 0 | 3 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 1 | 0 | 4 |
| Score Distribution | 0 | 0 | 10 | 5 | 2 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 60 |
| average | 3.5294 |
| STDEVP | 0.696 |

(5) Transmission Line Protection System (Type configuration and characteristics of each protection syst

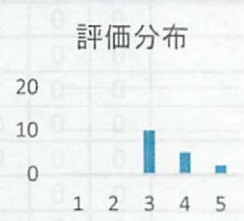
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 1 | 0 | 0 | 3 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 1 | 0 | 4 |
| Score Distribution | 0 | 0 | 11 | 4 | 2 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 59 |
| average | 3.4706 |
| STDEVP | 0.696 |

(6) Distribution Line Protection System (Type configuration and characteristics of each protection syste

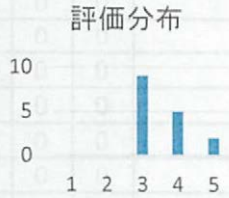
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 1 | 0 | 4 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 1 | 0 | 0 | 3 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 1 | 0 | 4 |
| Score Distribution | 0 | 0 | 10 | 5 | 2 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 60 |
| average | 3.5294 |
| STDEVP | 0.696 |

(7) Fault Calculation

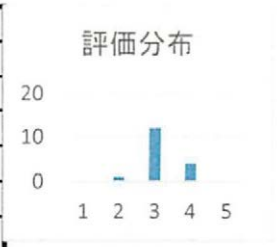
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 0 | 0 | 0 | 0 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 1 | 0 | 0 | 3 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 1 | 0 | 4 |
| Score Distribution | 0 | 0 | 9 | 5 | 2 | |




| | |
|---|---|
| total of P | 16 |
| sum of S | 57 |
| average | 3.5625 |
| STDEVP | 0.7043 |

(8-1) Theory of Relay Setting

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 1 | 0 | 0 | 3 |
| P5 | 0 | 1 | 0 | 0 | 0 | 2 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 1 | 0 | 0 | 3 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 1 | 0 | 0 | 3 |
| P18 | 0 | 0 | 1 | 0 | 0 | 3 |
| P19 | 0 | 0 | 0 | 1 | 0 | 4 |
| P20 | 0 | 0 | 0 | 1 | 0 | 4 |
| Score Distribution | 0 | 1 | 12 | 4 | 0 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 54 |
| average | 3.1765 |
| STDEVP | 0.5128 |

(8-2) Simulator Practice

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 1 | 0 | 0 | 3 |
| P2 | 0 | 0 | 1 | 0 | 0 | 3 |
| P3 | 0 | 0 | 1 | 0 | 0 | 3 |
| P4 | 0 | 0 | 1 | 0 | 0 | 3 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 1 | 0 | 0 | 3 |
| P8 | 0 | 0 | 1 | 0 | 0 | 3 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 1 | 0 | 4 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 1 | 0 | 4 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 10 | 3 | 4 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 62 |
| average | 3.6471 |
| STDEVP | 0.836 |

## Post-training Questionnaires

**Course Name:** System Protection and Control

Effectiveness evaluation caused by training ⇔ E. Intelligibility of the lecture and practical work

Q⇒ Did instructors/ lecturers provide a clear description of the subject?

| Rank | 1 | 2 | 3 | 4 | 5 | Score |
|---|---|---|---|---|---|---|

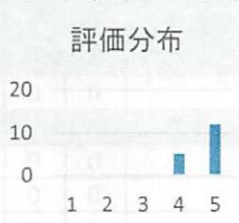
(1) Overview of Electric Power System (Configuration and characteristics of each equipment)

| | | | | | | |
|---|---|---|---|---|---|---|
| Person 1 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 2 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 3 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 4 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 5 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 6 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 7 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 8 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 9 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 10 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 11 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 12 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 13 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 14 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 15 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 16 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 17 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 18 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 19 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 5 | 12 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 80 |
| average | 4.705882 |
| STDEVP | 0.455645 |

(2) Overview of Protection Relay System (Configuration and objectives, type of relay, fail-safe syster

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 0 | 1 | 5 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 5 | 12 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 80 |
| average | 4.705882 |
| STDEVP | 0.455645 |

(3) Neutral Grounding System (Type and purpose of each neutral grounding system)

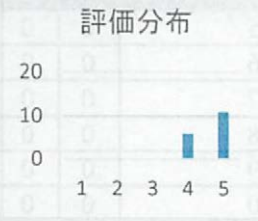
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 0 | 0 | 1 | 5 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 4 | 13 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 81 |
| average | 4.764706 |
| STDEVP | 0.424183 |


(4-1) Transformer Protection System (Configuration and objectives of electrical relay and mechanical

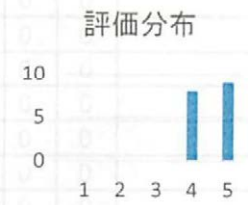
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 0 | 1 | 5 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 6 | 11 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 79 |
| average | 4.647059 |
| STDEVP | 0.477885 |



(4-2) Bus Protection System (Configuration and characteristics of system for each bus arrangement)

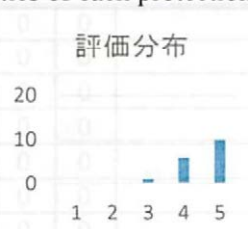
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 8 | 9 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.529412 |
| STDEVP | 0.499134 |

(5) Transmission Line Protection System (Type configuration and characteristics of each protection s

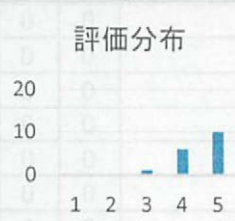
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 6 | 10 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.529412 |
| STDEVP | 0.605625 |

(6) Distribution Line Protection System (Type configuration and characteristics of each protection sys

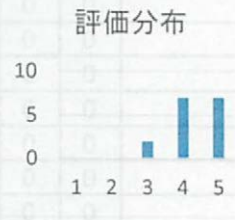
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 6 | 10 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.529412 |
| STDEVP | 0.605625 |

(7) Fault Calculation

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 0 | 0 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 2 | 7 | 7 | |

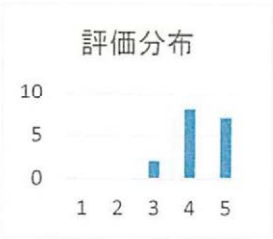



| | |
|---|---|
| total of P | 16 |
| sum of S | 69 |
| average | 4.3125 |
| STDEVP | 0.681795 |

(8-1) Theory of Relay Setting

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 2 | 8 | 7 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 73 |
| average | 4.294118 |
| STDEVP | 0.665512 |




(8-2) Simulator Practice

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 1 | 0 | 0 | 3 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 10 | 6 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 73 |
| average | 4.294118 |
| STDEVP | 0.570315 |

## Post-training Questionnaires

**Course Name:** System Protection and Control

Effectiveness evaluation caused by training ⇔ F. Satisfaction (comprehensive evaluation)

Q⇒ Please evaluate on the subject in a comprehensive manner.

(1) Overview of Electric Power System (Configuration and characteristics of each equipment)

| Rank | 1 | 2 | 3 | 4 | 5 | Dist of Score |
|---|---|---|---|---|---|---|
| Person 1 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 2 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 3 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 4 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 5 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 6 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 7 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 8 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 9 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 10 | 0 | 0 | 0 | 1 | 0 | 4 |
| Person 11 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 12 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 13 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 14 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 15 | 0 | 0 | 1 | 0 | 0 | 3 |
| Person 16 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 17 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 18 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 19 | 0 | 0 | 0 | 0 | 1 | 5 |
| Person 20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 6 | 10 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.5294 |
| STDEVP | 0.6056 |

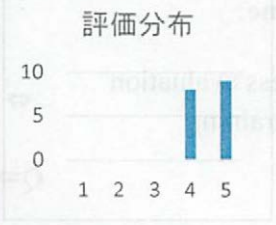
(2) Overview of Protection Relay System (Configuration and objectives, type of relay, fail-safe syster

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 6 | 11 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 79 |
| average | 4.6471 |
| STDEVP | 0.4779 |

(3) Neutral Grounding System (Type and purpose of each neutral grounding system)

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 8 | 9 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.5294 |
| STDEVP | 0.4991 |

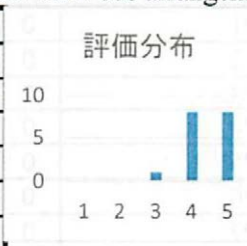
(4-1) Transformer Protection System (Configuration and objectives of electrical relay and mechanical

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 0 | 1 | 5 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 0 | 1 | 5 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 8 | 9 | |


| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.5294 |
| STDEVP | 0.4991 |

(4-2) Bus Protection System (Configuration and characteristics of system for each bus arrangement)

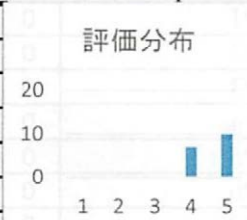
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 1 | 0 | 0 | 3 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 8 | 8 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 75 |
| average | 4.4118 |
| STDEVP | 0.5999 |

(5) Transmission Line Protection System (Type configuration and characteristics of each protection s

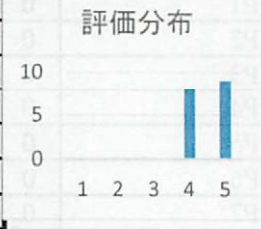
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 0 | 1 | 5 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 7 | 10 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 78 |
| average | 4.5882 |
| STDEVP | 0.4922 |

(6) Distribution Line Protection System (Type configuration and characteristics of each protection sy

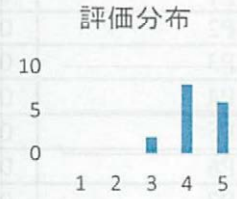
| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 1 | 5 |
| P4 | 0 | 0 | 0 | 0 | 1 | 5 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 0 | 1 | 5 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 8 | 9 | |




| | |
|---|---|
| total of P | 17 |
| sum of S | 77 |
| average | 4.5294 |
| STDEVP | 0.4991 |

(7) Fault Calculation

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 1 | 0 | 4 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 0 | 0 | 0 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 1 | 0 | 0 | 3 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 2 | 8 | 6 | |

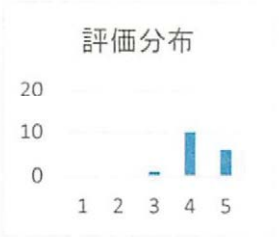



| | |
|---|---|
| total of P | 16 |
| sum of S | 68 |
| average | 4.25 |
| STDEVP | 0.6614 |

(8-1) Theory of Relay Setting

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 0 | 1 | 5 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 0 | 1 | 5 |
| P13 | 0 | 0 | 0 | 1 | 0 | 4 |
| P14 | 0 | 0 | 0 | 1 | 0 | 4 |
| P15 | 0 | 0 | 1 | 0 | 0 | 3 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 1 | 0 | 4 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 1 | 10 | 6 | |

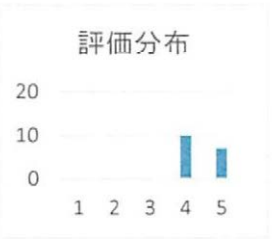
| | |
|---|---|
| total of P | 17 |
| sum of S | 73 |
| average | 4.2941 |
| STDEVP | 0.5703 |




(8-2) Simulator Practice

| | | | | | | |
|---|---|---|---|---|---|---|
| P1 | 0 | 0 | 0 | 0 | 1 | 5 |
| P2 | 0 | 0 | 0 | 1 | 0 | 4 |
| P3 | 0 | 0 | 0 | 1 | 0 | 4 |
| P4 | 0 | 0 | 0 | 1 | 0 | 4 |
| P5 | 0 | 0 | 0 | 0 | 1 | 5 |
| P6 | 0 | 0 | 0 | 1 | 0 | 4 |
| P7 | 0 | 0 | 0 | 1 | 0 | 4 |
| P8 | 0 | 0 | 0 | 1 | 0 | 4 |
| P9 | 0 | 0 | 0 | 1 | 0 | 4 |
| P10 | 0 | 0 | 0 | 1 | 0 | 4 |
| P11 | 0 | 0 | 0 | 0 | 1 | 5 |
| P12 | 0 | 0 | 0 | 1 | 0 | 4 |
| P13 | 0 | 0 | 0 | 0 | 1 | 5 |
| P14 | 0 | 0 | 1 | 0 | 0 | 3 |
| P15 | 0 | 0 | 0 | 1 | 0 | 4 |
| P16 | 0 | 0 | 0 | 1 | 0 | 4 |
| P17 | 0 | 0 | 0 | 0 | 1 | 5 |
| P18 | 0 | 0 | 0 | 0 | 1 | 5 |
| P19 | 0 | 0 | 0 | 0 | 1 | 5 |
| P20 | 0 | 0 | 0 | 0 | 1 | 5 |
| Score Distribution | 0 | 0 | 0 | 10 | 7 | |

| | |
|---|---|
| total of P | 17 |
| sum of S | 75 |
| average | 4.4118 |
| STDEVP | 0.4922 |



## 6) Amendment of Curriculum and Textbook for Engineers of ECG "System Protection and Control" Course (March, 2015)

Training Course for Engineers of ECG "System Protection and Control" was carried out from 23rd to 27th February 2015. And after the course an evaluation meeting was held between ECG Trainers and JICA Team.

Based on the result of the meeting and also the Monitoring Report on Training Course for Engineers of ECG "System Protection and Control", the Curriculum and Textbook were revised as documents attached hereto.

1. Revision of the Curriculum (Modify the time schedule)
   - ✓ Modify the time schedule according to the volume and the importance of the contents and the Trainee's request

2. Revision of the Textbook (Addition of auxiliary material)
   - ✓ Add the Trainer's materials (Power Point Data) to the Textbook to enhance the Trainee's understanding

The textbook used in the next training course will be changed from Version 1.0 to 1.1.

March 2015

# 1. Revision of the Curriculum (Modify the time schedule)

**Table-1. Curriculum of "System Protection and Control" Training for ECG Engineers (Before Revise)**

| DAYS | 8:30 – 9:00am | 9:00 – 10:00am | 10:00am-10:15am | 10:15am –12noon | 12noon - 1pm | 1:00 – 3:30pm |
|---|---|---|---|---|---|---|
| Day 1 | **Registration and Opening Ceremony** | 0. Orientation<br>1. Overview of Electric Power System<br>***Name (lecturer):***<br>***ING. George Hommey*** | S n a c k B r e a k | 1. Overview of Electric Power System<br>***ING. George Hommey*** | L u n c h B r e a k | 2. Overview of protection relay system<br>***ING. George Hommey*** |
| Day 2 | 3. Neutral Grounding System<br>***ING. Rodnell Bilson*** | | | 4. Protection System for Substation (Transformer Protection System)<br>***ING. Rodnell Bilson*** | | 4. Protection System for Substation (Transformer Protection System)<br>***ING. Rodnell Bilson*** |
| Day 3 | 4. Protection System for Substation (Bus Protection System)<br>5. Transmission Line Protection System<br>***ING. Rodnell Bilson*** | | | 5. Transmission Line Protection System<br>***ING. Rodnell Bilson*** | | 6. Distribution line Protection System<br>***ING. Frank Osei Owusu*** |
| Day 4 | 6. Distribution line Protection System<br>***ING. Frank Osei Owusu*** | | | 7. Fault Calculation<br>***ING. Frank Osei Owusu*** | | 8. Relay Setting<br>***ING. Frank Osei Owusu*** |
| Day 5 | 8. Relay Setting (Practice using Simulator)<br>***ING. Frank Osei Owusu***<br>***ING. Maxwell Graham***<br>***Engr. Maxwell Essel*** | | | 8. Relay Setting (Practice using Simulator)<br>***ING. Frank Osei Owusu***<br>***ING. Maxwell Graham***<br>***Engr. Maxwell Essel*** | | 8. Relay Setting (Practice using Simulator)<br>***ING. Frank Osei Owusu***<br>***ING. Maxwell Graham***<br>***Engr. Maxwell Essel***<br>Evaluation |

**Table-2. Curriculum of "System Protection and Control" Training for ECG Engineers (After Revise [Red part])**

| DAYS | 8:30 – 9:00am | 9:00 – 10:00am | 10:00am-10:15am | 10:15am –12noon | 12noon - 1pm | 1:00 – 3:30pm |
|---|---|---|---|---|---|---|
| Day 1 | **Registration and Opening Ceremony** | 0. Orientation<br>1. Overview of Electric Power System<br>***Name (lecturer):***<br>***ING. George Hommey*** | Snack Break | 1. Overview of Electric Power System<br>***ING. George Hommey*** | Lunch Break | 2. Overview of protection relay system<br>***ING. George Hommey*** |
| Day 2 | 3. Neutral Grounding System<br>4. Protection System for Substation (Transformer and Bus Protection System)<br>***ING. Rodnell Bilson*** | | | 4. Protection System for Substation (Transformer and Bus Protection System)<br>***ING. Rodnell Bilson*** | | 5. Transmission Line Protection System<br>***ING. Rodnell Bilson*** |
| Day 3 | 6. Distribution line Protection System<br>***ING. Frank Osei Owusu*** | | | 6. Distribution line Protection System<br>***ING. Frank Osei Owusu*** | | 6. Distribution line Protection System<br>***ING. Frank Osei Owusu*** |
| Day 4 | 7. Fault Calculation<br>***ING. Frank Osei Owusu*** | | | 7. Fault Calculation<br>***ING. Frank Osei Owusu*** | | 7. Fault Calculation (Simple Exercise for Relay Setting)<br>***ING. Frank Osei Owusu*** |
| Day 5 | 8. Relay Setting (Practice using Simulator)<br>***ING. Frank Osei Owusu***<br>***ING. Maxwell Graham***<br>***Engr. Maxwell Essel*** | | | 8. Relay Setting (Practice using Simulator)<br>***ING. Frank Osei Owusu***<br>***ING. Maxwell Graham***<br>***Engr. Maxwell Essel*** | | 8. Relay Setting (Practice using Simulator)<br>***ING. Frank Osei Owusu***<br>***ING. Maxwell Graham***<br>***Engr. Maxwell Essel***<br>Evaluation |

## 2. Revision of the Textbook (Addition of auxiliary material)