



UNIVERSITY OF SRI JAYEWARDENEPURA
Faculty of Computing
Bachelor of Computing Honours in Information Systems
Third Semester Examination
August 2024
CIS 2072 – System Administration and Maintenance
Duration Two (02) Hours

INSTRUCTIONS / INFORMATION TO CANDIDATES:

1. Answer **ALL** the questions.
2. This paper contains Four (4) Questions on Four (4) pages.
3. This is a closed-book examination.
4. The marks assigned for each question and sections thereof are included in brackets.
5. Start a new question on a new page.
6. Calculators, all other devices, and tools are not allowed.
7. All examinations of the Faculty of Computing are conducted under the Examination Rules and Regulations of the University of Sri Jayewardenepura

Question 01

- (a)
- (i) What is a Linux distribution? (05 Marks)
 - (ii) How do Linux distributions differ from one another? (05 Marks)
 - (iii) Provide **three (03)** examples of different Linux distributions and their typical use cases. (15 Marks)
- (b)
- (i) Give **two (02)** reasons why users might prefer windows over Linux. (05 Marks)
 - (ii) Briefly describe the basic architecture of the Linux operating system. (10 Marks)
 - (iii) State **three (03)** advantages of using Linux over other operating systems. (15 Marks)
- (c)
- (i) What is a run level in Linux? (05 Marks)
 - (ii) Briefly discuss how each of the run levels affect the system's operations. (15 Marks)
- (d)
- (i) What types of information are typically recorded in user logs on a Linux system? (10 Marks)
 - (ii) Why is the information you mentioned in (1)(d)(ii) valuable to system administrators? (15 Marks)

Total: 100 Marks

Question 02

- (a)
- (i) List **five (05)** major tasks of system administration in an IT company. (10 Marks)
 - (ii) Briefly describe the sources of information for system administrators. (10 Marks)
 - (iii) What are the challenges faced by a system administrator when handling network resources? (10 Marks)
- (b) Consider following scenarios and list command (s) for each scenario which you will be using to investigate and solve the issue as a System Administrator. Briefly state what you are trying to do from the commands that you use in each scenario.

- (i) You notice that the system is experiencing high CPU usage. (10 Marks)
- (ii) You need to be temporarily disabled a user without deleting their account. (10 Marks)
- (iii) A user is complaining that his/her internet connection is not working. (10 Marks)
- (c)
- (i) State the difference between *cron* and *at* utilities in Linux. ✓ (05 Marks)
- (ii) How do you schedule a job using *at* command for the coming Monday at a time twenty (20) minutes later than the current time. (10 Marks)
- (d)
- (i) How do you create, edit, and delete *cronjobs* for individual users using the commands in *cron* utility. (10 Marks)
- (ii) Write the crontab entries to schedule the following jobs according to the given time using *cron* utility. (15 Marks)
- To run sample.sh every day at 9 pm
 - To run sample.sh twice a day. say 5am and 5pm
 - To run sample.sh every 10 minutes

Total: 100 Marks

Question 03

- (a)
- (i) Briefly describe **three (03)** rules to be followed when naming the variables in shell scripts by providing appropriate examples. ✓ (15 Marks)
- (ii) Compare and contrast local variables and environmental variables in Linux. (10 Marks)
- (iii) Using an appropriate coding example, explain briefly the functionality of continue and break statements used in Shell Script? (10 Marks)
- (b)
- (i) Describe the following decision-making structures used in shell scripting by giving suitable examples. (10 Marks)
- if...else...fi statement
 - case statement
- (ii) Write a shell script code segment to find whether the given year is a leap year or not. The output should be displayed as 'X is a leap year'. (X should be replaced by the year which is given by the user.) (10 Marks)

- (iii) Write a shell script code segment to display the following pattern on the terminal. (10 Marks)

```
*
* *
* * *
* * * *
* * * * *
```

- (c)
- (i) What is the main advantage of using functions in shell scripting. (05 Marks)
- (ii) Write a script that defines a function to calculate the area of the circle given its radius and use this function to calculate the area of a circle when radius is 3. (Hint: $A = \pi r^2$, A – area of the circle, r – radius of the circle, $\pi = 3.14$) (10 Marks)

- (d)
- (i) What sort of information is held in the following files in Linux User Management? (10 Marks)
- /etc/passwd
 - /etc/shadow
 - /etc/group
 - /etc/gshadow
 - /etc/login.defs
- (ii) The IT department of a company needs to grant temporary access to an employee named 'John'. (10 Marks)
- Write the Linux terminal command to create the account for John and set it to be automatically disabled after 30 days from the date of creation?
 - Write the Linux terminal command to add information to John's account by mentioning that it is a temporary test account?

Total: 100 Marks

Question 04

- (a) What are the **three (03)** basic components of computer security? (10 Marks)
- (b)
- (i) What are the **four (04)** acts that cause harm to computer and network security? (10 Marks)
- (ii) Write **four (04)** basic approaches for the defense of computing systems? (10 Marks)

(c)

(i) State the *Principle of Weakest Link*.

(05 Marks)

(ii) Considering the following scenario, choose the appropriate answer from the three options given and briefly justify your answer.

(10 Marks)

Your supervisor is very busy and asks you to log into the HR Server using her user-ID and password to retrieve some reports. What should you do?

- a) *It's your boss, so it's okay to do this.*
- b) *Ignore the request and hope she forgets.*
- c) *Decline the request and remind your supervisor that it is against security policy.*

(iii) Consider the following scenario and identify the *vulnerability, threat*, and *controls* mentioned in it.

(15 Marks)

A company maintains its data inside a dedicated data center consists of multiple data servers. The data center is established inside a separate room surrounded by strong walls and a fingerprint-operated glass door. The room is cooled with an enterprise grade cooling system that optimally transfers the heat generated from inside the room to the outside. There is an alarm system in the data center that activates whenever the door is breached or whenever the temperature inside the room goes above a threshold level. The entire company solely relies on the national power grid.

(d) Cryptography is a primary control employed to ensure the basic security properties of a computer system. In essence, a cipher is used to scramble a cleartext into a ciphertext. *Playfair cipher* is one such simple cipher used for encrypting textual information. Follow the given instructions to encrypt the message "*COME AT SEVEN*" with the key "*CROCODILE*".

(i) Draw the grid for the given key. **Hint:** Omit the letter **J** from the grid.

(10 Marks)

(ii) Prepare the cleartext by splitting the original message into pairs of letters.

Hint: Use **Z** as bogus letter to create the last pair.

(10 Marks)

(iii) Derive the encrypted text using the grid and the cleartext. **Hint:** Use the diagonal rule only to encrypt the pairs.

(20 Marks)

Total: 100 Marks

..... End of the Exam Paper