1. Basics of Shell Scripting

✅ **Practice Sets:**

- Write a script to print "Hello, World!"
- Create a script that takes user input and prints it back
- Write a script to check if a file exists
- Display system date and time
- Print the username and home directory

✅ **Mini Project:**
📌 **User Information Script** – A script that displays system username, hostname, current directory, and the number of logged-in users

---

2. Working with Variables and Data Types

✅ **Practice Sets:**

- Define and print variables
- Swap two numbers using variables
- Perform arithmetic operations (+, -, *, /)
- Read user input and store it in variables

✅ **Mini Project:**
📌 **Simple Calculator** – A script that performs basic arithmetic operations (add, subtract, multiply, divide) based on user input

---

3. Conditional Statements (if-else, case)

✅ **Practice Sets:**

- Check if a number is even or odd
- Check if a file is readable, writable, or executable
- Compare two numbers and print the larger one
- Use `case` to print the day of the week based on user input

✅ **Mini Project:**
📌 **Grade Calculator** – A script that takes user marks and prints the corresponding grade (A, B, C, Fail)

---

4. Loops (for, while, until)

✅ **Practice Sets:**

- Print numbers 1 to 10 using a loop
- Find the factorial of a number
- Reverse a number using a loop
- Print the Fibonacci series up to N terms

✅ **Mini Project:**
📌 **Number Guessing Game** – A script that generates a random number and lets the user guess it with hints

---

5. Functions in Shell Scripting

✅ **Practice Sets:**

- Write a function to find the square of a number
- Create a function to check if a string is palindrome
- Implement a function to find the greatest of three numbers

✅ **Mini Project:**
📌 **Menu-driven System Info Script** – A script with a menu (1. Check disk usage, 2. Check memory usage, 3. Show uptime)

---

6. File Handling & Text Processing (awk, sed, grep)

✅ **Practice Sets:**

- Use `grep` to find a word in a file
- Use `awk` to print the second column of a CSV file
- Use `sed` to replace a word in a file
- Count the number of lines and words in a file

✅ **Mini Project:**
📌 **Log File Analyzer** – A script that filters log files for errors and generates a report

---

7. Working with System Processes & Jobs

✅ **Practice Sets:**

- List all running processes
- Kill a process by its PID
- Check if a specific process is running

✅ **Mini Project:**
📌 **Process Monitor** – A script that checks if a specific process is running and restarts it if it crashes

---

8. User Management & Automation

✅ **Practice Sets:**

- Create a new user and set a password
- Add a user to a group
- Lock and unlock a user account

✅ **Mini Project:**
📌 **User Account Manager** – A script to create, delete, and modify users automatically

---

9. Networking & Server Monitoring

✅ **Practice Sets:**

- Ping a website and check if it's online
- Find your public and private IP addresses
- Get the system's network configuration

✅ **Mini Project:**
📌 **Server Health Monitor** – A script that checks CPU, memory, disk usage, and network connectivity

---

10. Backup & Automation Scripts

✅ **Practice Sets:**

- Copy files from one directory to another
- Automate a daily backup using cron jobs
- Compress a directory using tar and gzip

✅ **Mini Project:**
📌 **Automated Backup System** – A script that takes scheduled backups of important files

11. Environment Setup & System Configuration

✅ **Practice Sets:**

- Write a script to install packages (e.g., `nginx`, `docker`)
- Configure system-wide environment variables
- Automate SSH key setup for passwordless login

✅ **Mini Project:**
📌 **Automated Server Setup** – A script that installs and configures essential services like Nginx, Docker, and sets up firewall rules

---

12. CI/CD Automation & Scripting

✅ **Practice Sets:**

- Write a script to automate Git pull and restart a service
- Create a script that triggers a Jenkins job remotely
- Write a script that checks for code changes and notifies a Slack channel

✅ **Mini Project:**
📌 **Git Auto-Deployment Script** – A script that pulls code from Git, builds it, and deploys it to a test server

---

13. Docker & Kubernetes Automation

✅ **Practice Sets:**

- Write a script to automate Docker container creation
- Create a script to check running Docker containers
- Automate `kubectl` commands to get pod statuses

✅ **Mini Project:**
📌 **Container Health Check** – A script that monitors Docker containers and restarts failed ones

---

14. Cloud Automation (AWS, GCP, Azure)

✅ **Practice Sets:**

- Write a script to create an AWS EC2 instance using AWS CLI
- Automate S3 bucket creation and file upload
- Create a script to start/stop an AWS instance based on schedule

✅ **Mini Project:**
📌 **AWS Resource Monitor** – A script that checks running EC2 instances, CPU usage, and sends alerts

---

15. Security & Compliance Automation

✅ **Practice Sets:**

- Write a script to scan open ports using `netstat`
- Automate checking for failed SSH login attempts
- Create a script that enforces password policies

✅ **Mini Project:**
📌 **Security Audit Script** – A script that scans for security vulnerabilities (open ports, weak passwords, failed logins)

---

16. Log Analysis & Monitoring

✅ **Practice Sets:**

- Write a script to analyze system logs for failed SSH attempts
- Create a script that extracts the top 10 IPs accessing a web server
- Automate log rotation using `logrotate`

✅ **Mini Project:**
📌 **Log Monitoring & Alert System** – A script that checks logs in real-time and sends alerts if errors are detected

---

17. Performance Tuning & Resource Management

✅ **Practice Sets:**

- Write a script to check CPU and memory usage
- Automate killing high CPU-consuming processes
- Schedule resource monitoring reports

✅ **Mini Project:**
📌 **Auto-Scaling Script** – A script that monitors CPU usage and increases/decreases server resources dynamically

---