MKCL's System Engineer - Project Trainee Recruitment Drive 2023

Syllabus for Online Objective Test – (70 Questions – 70 Marks)

Technical Skills – (70 questions - 70 marks)

1. Basic Networking Concepts – 20 Questions
2. Basic PC Troubleshooting – 10 Questions
3. Database Concepts – 15 Questions
4. Operating System Basics – 15 Questions
5. Software Development Lifecycle Basics – 5 Questions
6. Cloud Servers Basics- 5 Questions

1. Basic Networking Concepts - 20 Questions

- Network
- Nodes
- Client Server Model
- IP Addresses
- Protocols
- LAN/WAN
- Router

Resources

- **eBook**

https://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

Video Tutorial

https://youtu.be/VvXzJTkzTLM
https://www.youtube.com/watch?v=0j6-QFnnwQk

2. Basic PC Troubleshooting - 10 Questions

- Troubleshooting Process
  - Identify the Problem
  - Establish and Test a Theory
  - Verifying the System Functionality

- Troubleshooting PC hardware
  - Troubleshooting BIOS Settings
  - POST related Issues
  - Troubleshooting Motherboards
  - Troubleshooting Display Devices
  - Troubleshooting Adapter Cards

- ○ Troubleshooting RAM
- ○ Troubleshooting Cooling System
- ○ Troubleshooting Storage Devices
- ○ Troubleshooting Printers

- ● Troubleshooting Mobile Devices
  - ○ Troubleshooting Laptops
  - ○ Troubleshooting Other Mobile Devices
  - ○ Device Repairing and Reassembly

- ● Software Utilities for Troubleshooting Hardware
  - ○ Hardware Monitors
  - ○ Hardware Upgrade Advisors
  - ○ Using Event Log Viewer

Resources
- **Book**

    Troubleshooting and Maintaining Your PC by Dan Gookin
    https://www.booksfree.org/troubleshooting-and-maintaining-your-pc-by-dan-gookin-pdf-free-download/

- **Videos**
  - ○ Top 15 computer problems with solution:
    https://www.youtube.com/watch?v=nBpoZOo9RfQ

- **Additional reference**
- https://www.pluralsight.com/blog/tutorials/troubleshooting-hardware
- https://www.tomshardware.com/best-picks

3. Database Concepts - 15 Questions

- ● Introduction to Database
- ● Database-System Applications
- ● Purpose of Database Systems
- ● Database Languages
  - ○ Data-Manipulation Language
  - ○ Data-Definition Language
  - ○ Data control language
  - ○ Transaction control language (TCL)

- ● Introduction to the Relational Model
  - ○ Database Schema
  - ○ Keys

- ○ Relational Query Languages

- Introduction to SQL
  - ○ Overview of the SQL Query Language
  - ○ SQL Data Definition
  - ○ Basic Structure of SQL Queries
  - ○ Additional Basic Operations
  - ○ Set Operations
  - ○ Null Values
  - ○ Aggregate Functions
  - ○ Nested Subqueries
  - ○ Modification of the Database
  - ○ Join Expressions
  - ○ Views
  - ○ Transactions
  - ○ Integrity Constraints
  - ○ SQL Data Types and Schemas
  - ○ Accessing SQL From a Programming Language
  - ○ Functions and Procedures
  - ○ Triggers

- Database Design
  - ○ The Entity-Relationship Model
  - ○ Constraints
  - ○ Normalization

- Transaction Management
  - ○ Transaction Concept
  - ○ ACID properties

- Overview of NoSQL Database (MongoDB)

Resources
- **Book**
  - ○ DATABASE SYSTEM CONCEPTS by Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Sixth edition

- **DBMS tutorial**
  - ○ https://www.w3schools.com/sql
  - ○ https://www.javatpoint.com/dbms-tutorial

- **Mysql official docs**
  - ○ https://docs.oracle.com/en-us/iaas/mysql-database/doc/getting-started.html

- **Mongo Overview**
  - https://www.tutorialspoint.com/mongodb/mongodb_overview.htm

4. Operating System Basics – 15 Questions

- Process Management
  - Creating, Scheduling, and Terminating processes.
  - Process states
  - Process control blocks
  - Process scheduling algorithms
  - Inter-process communication
  - Synchronization

- Memory Management
  - Allocating and managing computer memory
    - Virtual memory
    - Paging
    - Segmentation
    - Memory allocation strategies
    - Memory hierarchy.

- File Systems
  - File organization
  - Directory Structures
  - File operations
  - File permissions
  - File system types (e.g., FAT, NTFS, ext4)

- Device Management
  - Device drivers
  - Device allocation
  - Input/output operations
  - Interrupt handling
  - Device scheduling

- CPU Scheduling
  - Scheduling algorithms (e.g., FCFS, SJF, Round Robin)
  - Context switching
  - Process priorities

- Deadlock
  - Deadlock prevention, avoidance, detection, and recovery.

5. Software Development Life Cycle Basics – 5 Questions

- Software processes
  - https://www.javatpoint.com/software-processes
- Software Development Life Cycle
  - https://www.javatpoint.com/software-engineering-software-development-life-cycle
- SDLC Models
  - Waterfall model
  - Spiral model
  - V-model
  - Incremental model
  - Agile model - Sprint

Reference : https://www.javatpoint.com/software-engineering-sdlc-models

6. Cloud Servers Basics – 5 Questions

- Cloud Computing
  - Infrastructure as a Service (IaaS)
  - Platform as a Service (PaaS)
  - Software as a Service (SaaS)

- Virtualization
  - Virtual machines (VMs)
  - Hypervisors
  - Containerization
  - Advantages of virtualization.

- Scalability and Elasticity
  - Exploring the ability of cloud servers to scale up or down based on demand (scalability) and dynamically allocate resources (elasticity) to handle varying workloads.

- Networking in the Cloud
  - Virtual networks
  - Subnets
  - Security groups
  - Network load balancers
  - VPN connections
  - Network configurations in a cloud server environment.

- Storage in the Cloud
  - Object storage, Block storage, File storage
  - Data durability

- o Replication
- o Data lifecycle management.

- Security in the Cloud
  - o Identity and access management (IAM)
  - o Encryption
  - o Network security groups
  - o Security audits, and compliance.

Reference : https://www.guru99.com/cloud-computing-for-beginners.html

Stage II: Final Hands-on Test

Syllabus for Hands-on Test –
- Installation of Operating System (Windows/ Linux)
- Configuring TCPIP (wired/ wireless)
- Installation of Drivers
- Troubleshooting of common issues and
- Hardware Networking related basic operations