



## **Syllabus of Written Examination for the position of Deputy System Manager**

(This syllabus is intended to serve as a general guideline for preparation.

It is not exhaustive, and additional topics or domains may be included by the Institute as required.)

### **Stage I- Written Examination**

| <b>Subject (All questions will be objective type with no negative marking)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Maximum Marks</b> | <b>Time Duration</b> |
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| <p><b>Advanced Linux System Administration &amp; Virtualization</b></p> <ul style="list-style-type: none"> <li>• <b>OS &amp; Boot Management:</b> RHEL/CentOS/UNIX installation, Kernel upgrades, patch management, and GRUB2 boot recovery.</li> <li>• <b>Process Management:</b> Managing systemd, cgroups, nice/renice, and handling zombie processes.</li> <li>• <b>Virtualization:</b> Deep dive into hypervisor administration using <b>KVM, XCP-ng, and XOA (Xen Orchestra)</b>. Managing VM snapshots, resource provisioning, virt-manager, virsh, and live migrations.</li> <li>• <b>Performance Monitoring:</b> Identifying CPU, memory, and I/O bottlenecks using top, htop, vmstat, iostat, sar, and tuned daemon profiles.</li> </ul> <p><b>Network Services &amp; Directory Management</b></p> <ul style="list-style-type: none"> <li>• <b>Directory Services:</b> Configuration, setup, and administration of <b>Active Directory (AD) and LDAP</b> for centralized enterprise user authentication and policy management.</li> <li>• <b>Network Servers:</b> In-depth configuration and management of essential network infrastructure servers including <b>DHCP, DNS, and RADIUS</b>.</li> </ul> <p><b>Storage Architecture &amp; File System Management</b></p> <ul style="list-style-type: none"> <li>• <b>Logical Volume Management (LVM):</b> Configuring Physical Volumes (PV), Volume Groups (VG), and Logical Volumes (LV), including <b>online file system extension with zero downtime</b>.</li> <li>• <b>Network Storage &amp; RAID:</b> Configuring and troubleshooting NFS and Samba shares, implementing RAID levels (0, 1, 5), and managing ext4 and xfs filesystems.</li> </ul> <p><b>Web Server Configuration &amp; Database Administration</b></p> <ul style="list-style-type: none"> <li>• <b>Web Server Hosting:</b> Configuring Apache HTTP Server, setting up Virtual Hosts for hosting in-house web apps, implementing SSL/TLS certificates, and analyzing web server logs.</li> <li>• <b>Database Services:</b> Service administration for MariaDB, MySQL, PostgreSQL, managing user permissions, and executing backups and restorations using mysqldump.</li> </ul> | <b>50</b>            | <b>Total 1 Hour</b>  |

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| <p><b>Advanced Cybersecurity &amp; System Hardening</b></p> <ul style="list-style-type: none"> <li>• <b>SELinux Administration:</b> Navigating enforcing/permissive modes, and using tools like semanage, restorecon, and audit2allow to build customized security policies.</li> <li>• <b>Firewall &amp; Access Control:</b> Advanced configuration of firewall zones and iptables rules. Implementing strict SSH Key Management, Sudo Policies, and Linux File Permissions/ACLs for account provisioning.</li> </ul> <p><b>High-Performance Computing (HPC) Architecture &amp; Policy</b></p> <ul style="list-style-type: none"> <li>• <b>HPC Architecture:</b> Understanding master node vs. compute node environments, CPU core/thread optimization, and high-performance parallel file systems like BeeGFS.</li> <li>• <b>Job Scheduling &amp; Workload Management:</b> Administration of the <b>Slurm</b> job scheduler, configuring queues/partitions (Short, Medium, Long, Serial, Parallel), and enforcing wall clock time, core, and node limits.</li> <li>• <b>Policy Enforcement:</b> Managing user access via login nodes, enforcing default storage quotas (1 TB per user), and preventing interactive jobs directly on login or head nodes.</li> </ul> <p><b>Automation, Scripting &amp; Version Control</b></p> <ul style="list-style-type: none"> <li>• <b>Shell Scripting:</b> Writing Bash scripts utilizing awk and sed for log rotation, disk alerts, health checks, and user access automation.</li> <li>• <b>Job Automation &amp; Source Control:</b> Managing scheduled tasks via cron and tracking configuration/script changes using Git version control.</li> </ul> <p><b>Backup &amp; Disaster Recovery Operations</b></p> <ul style="list-style-type: none"> <li>• <b>Backup Solutions:</b> Implementing rsync/tar based/ equivalent backup strategies.</li> <li>• <b>Disaster Recovery:</b> Formulating DR planning, orchestrating monthly DR drills, and live restore testing to ensure sub-2-hour Recovery Time Objectives (RTO).</li> </ul> |           |          |
| <b>Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>50</b> | <b>-</b> |

**Note:**

- Only those applicants who score the minimum cut-off marks in the written examination, as may be decided by IIT Indore at its discretion, will be called for the further stage of the recruitment process.

## **Syllabus of Skill Test for the position of Deputy System Manager**

### **Stage II**

| <b>Skill Test</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Maximum Marks</b> |
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| <p><b>Virtualization &amp; Storage Manipulation</b></p> <ul style="list-style-type: none"><li>• <b>Task:</b> Deploy and manage virtual machines utilizing <b>KVM or XCP-ng (via XOA)</b>, including resource allocation, templates and snapshot management.</li><li>• <b>Task:</b> Extend a live LVM logical volume on a Linux server without bringing the system down.</li></ul> <p><b>Network Services Deployment</b></p> <ul style="list-style-type: none"><li>• <b>Task:</b> Install and configure a basic functioning environment for <b>DNS, DHCP, or LDAP/AD</b>, ensuring correct routing and authentication logic.</li></ul> <p><b>Web &amp; Database Deployment</b></p> <ul style="list-style-type: none"><li>• <b>Task:</b> Spin up an Apache web server, configure a virtual host with a self-signed SSL/TLS certificate, and securely open the necessary ports using firewalld and SELinux.</li><li>• <b>Task:</b> Perform a secure backup of a dummy MySQL/MariaDB database using mysqldump.</li></ul> <p><b>HPC Scheduling &amp; Automation</b></p> <ul style="list-style-type: none"><li>• <b>Task:</b> Write a simple Slurm batch script to submit a mock parallel job requesting specific cores, nodes, and a wall clock time limit.</li><li>• <b>Task:</b> Write a Bash script using awk/sed that parses a sample log file to find failed SSH login attempts or high CPU alerts.</li></ul> | <b>50</b>            |
| <b>Interview</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>50</b>            |

#### **Note:**

- In Stage II, the Skill Test will be conducted first, and only those applicants who score the minimum qualifying marks in the Skill Test will be assessed in the Interview.