

Technical Superintendent Exam, CSE Department, IIT Bombay, 17 July 2025 (45 minutes)

Name: _____ Applicant ID: _____

For each Question tick **ALL** correct choices (there may be more than one).

Ticking **ALL** correct choices and **ONLY** correct choices: **1 mark**.

Ticking any **wrong** choice or **missing** any correct choice: **Negative -1/3 mark**

1. What is the purpose of the sticky bit file permission in Linux?
 - A. To restrict the deletion of files to the owner only
 - B. To allow only the owner to execute a file
 - C. To set the group ID bit for a file
 - D. To enable mandatory locking on a file
2. Which of the following files would you edit to configure the Linux kernel's IPv4 forwarding behavior?
 - A. /etc/sysctl.conf
 - B. /etc/network/interfaces
 - C. /etc/hosts
 - D. /etc/resolv.conf
3. What is the purpose of an LDAP referral?
 - A. To redirect a client to another LDAP server
 - B. To provide additional information about an LDAP entry
 - C. To enable authentication for LDAP users
 - D. To specify the LDAP server's schema
4. What is the primary difference between a patch and a hotfix?
 - A. A patch is a permanent fix, while a hotfix is temporary
 - B. A patch is a cumulative update, while a hotfix is a single fix
 - C. A patch is applied manually, while a hotfix is applied automatically
 - D. None of the above
5. Which protocol is commonly used for sending email between email servers?
 - A. SMTP (Simple Mail Transfer Protocol)
 - B. IMAP (Internet Message Access Protocol)
 - C. POP3 (Post Office Protocol version 3)
 - D. HTTP (Hypertext Transfer Protocol)
6. What is a virtual host in the context of web servers?
 - A. A physical server hosting multiple websites
 - B. A single website hosted on a dedicated server
 - C. A configuration that allows multiple websites to share the same IP address
 - D. A type of web server software

7. You are setting up an OpenLDAP server on a Linux system. After installation, you want to allow LDAP clients to connect and browse the directory. Which of the following files should you most likely configure for access control?
- A. /etc/hosts.allow
 - B. /etc/openldap/slapd.d/acl.conf
 - C. /etc/openldap/ldap.conf
 - D. /etc/nsswitch.conf
8. In a BIND DNS server, you want to delegate authority for a subdomain `lab.example.com` to another name server. What kind of DNS record should be used in the zone file of `example.com`?
- A. CNAME
 - B. BS
 - C. NS
 - D. MX
9. A user complains that they can send emails but cannot receive them. You suspect an issue with the mail server configuration. Which of the following services is most likely misconfigured or not running?
- A. Postfix (SMTP)
 - B. Dovecot (IMAP/POP3)
 - C. DNS resolver
 - D. cron
10. You have just configured a virtual host in Apache, but the new website is not accessible. Which command would you use on a Debian-based system to enable the site and reload Apache?
- A. `a2ensite`, then `systemctl restart apache2`
 - B. `a2enmod`, then `systemctl start httpd`
 - C. `httpd -k restart`
 - D. `enable-site`, then `apachectl reload`
11. Which of the following is NOT typically used as an open-source alternative to manage web servers or services?
- A. Nginx
 - B. Lighttpd
 - C. IIS
 - D. Apache
12. You added a new DNS A record, but clients still resolve the old IP address. Which of the following is the most likely reason?
- A. Incorrect MX record
 - B. High TTL value in the DNS record
 - C. Missing SPF record
 - D. DNS server is not listening on port 443
13. What are primary benefits of using automated tools for managing and installing software on a network of machines?
- A. Software has to be installed only once, subsequent upgrades are automatic
 - B. Does not need admin access on local machines on which software is installed
 - C. Decreases manual effort of installation and verification
 - D. Ensure consistent configurations and reduces the risk of misconfigurations.
14. Which of the following options are software package managers used for installing, updating, removing, and searching of software from repositories?
- A. make
 - B. gcc
 - C. apt
 - D. yum
15. Which tools are essential for managing code changes and collaboration during software development?
- A. emacs
 - B. git
 - C. vim
 - D. vi

16. Use of which technology enables multiple OS versions to execute on the same machine?
- A. Containerization
 - B. Virtualization
 - C. Database Management System
 - D. Load Balancer
17. Which of the following are tools for users and applications to manage and interact with files and directories?
- A. stat B. touch C. mount D. ifconfig
18. With regards to docker, what is a Dockerfile?
- A. A file listing the location of the docker registry hubs
 - B. A file with instructions used to build a Docker image
 - C. A file used to specify the resource limits of a container
 - D. A file used to save data of container applications
19. Which of the following statements are TRUE?
- A. A virtual machine and a container can execute simultaneously on a machine.
 - B. A virtual machine and a container cannot execute simultaneously on a machine.
 - C. Only one virtual machine can execute on a machine at any point of time.
 - D. Multiple virtual machines can execute simultaneously on a machine.
20. Which of the following applications can be setup, configured and deployed within containers?
- A. Email server
 - B. Web server
 - C. Firewall
 - D. DNS server
21. Which of the following commands shows real-time updates of system resource usage, including CPU, memory, and process information?
- A. uptime B. ps -ef C. top D. vmstat
22. Which iptables command would you use to allow incoming SSH connections on port 22?
- A. iptables -A INPUT -p tcp -dport 22 -j DROP
 - B. iptables -A OUTPUT -p tcp -dport 22 -j ACCEPT
 - C. iptables -A INPUT -p tcp -dport 22 -j ACCEPT
 - D. iptables -I FORWARD -p tcp -dport 22 -j ACCEPT
23. What does the following iptables rule do?
- ```
iptables -A INPUT -m state --state ESTABLISHED,RELATED -j ACCEPT
```
- A. Drops all established connections
  - B. Accepts all new incoming connections
  - C. Allows traffic related to already established connections
  - D. Blocks invalid connection attempts

24. You want to allow only traffic from a specific IP (192.168.1.10). Which command is correct?
- A. iptables -A INPUT -s 192.168.1.10 -j ACCEPT
  - B. iptables -D INPUT -s 192.168.1.10 -j ACCEPT
  - C. iptables -A OUTPUT -d 192.168.1.10 -j ACCEPT
  - D. iptables -P FORWARD -s 192.168.1.10 -j ACCEPT
25. In Nagios, what is the primary purpose of a **plugin**?
- A. To create user dashboards
  - B. To automate backups
  - C. To perform checks on hosts and services
  - D. To install operating system updates
26. In Zabbix, what is a **template** used for?
- A. Compressing logs for archival
  - B. Automatically installing agents on hosts
  - C. Grouping triggers, items, and graphs for reuse across multiple hosts
  - D. Managing user permissions
27. Which protocol is commonly used by monitoring tools like Nagios and Zabbix to perform remote checks without installing an agent?
- A. FTP
  - B. SNMP
  - C. HTTP
  - D. SMTP
28. What does the ping command use to test connectivity between two hosts?
- A. TCP packets
  - B. ARP requests
  - C. ICMP Echo Request
  - D. DNS queries
29. What does the /etc/resolv.conf file configure?
- A. IP forwarding rules
  - B. Routing tables
  - C. DNS servers for name resolution
  - D. Ethernet hardware settings
30. What is the broadcast address for the IP block 192.168.100.128/26?
- A. 192.168.100.191
  - B. 192.168.100.255
  - C. 192.168.100.129
  - D. 192.168.100.192

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CSE Department, IIT Bombay  
Technical Superintendent (Short Answers) 17 July 2025 (30 minutes)

Name: \_\_\_\_\_ Applicant ID: \_\_\_\_\_

Please answer the 3 questions in the space provided below.  
Plan your answer first and write clearly. Each question carries **5 marks**.

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1. From your browser you connect to [www.google.com](http://www.google.com) and the browser displays the web page. Explain from the networking perspective 3 important steps/protocols used during this process.

2. Briefly explain what are Virtual Machines (VMs)? and what are Containers?  
Explain briefly 2 high level differences between them.

3. Assume each department in IIT Bombay has its own subdomain, name servers and servers for sending and receiving email. Arjun is a user in CSE Department with email ID *arjun@cse.iitb.ac.in*. Bhim is a user in EE Department with email ID *bhim@ee.iitb.ac.in*. From a laptop in a lab in the CSE department Arjun sends an email to Bhim. Bhim reads the email from a laptop in his lab in the EE Department. Using suitable block diagrams briefly illustrate the main steps that happen. Name all the major software components and protocols used clearly to create, store and forward the message.