

ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2024
EXAMINATION CATEGORY: TECHNICAL

PAPER II: GENERAL SUBJECT KNOWLEDGE PAPER FOR ICT

Date	: October 4, 2024
Total Marks	: 100
Writing Time	: 90 minutes (1.5 hours)
Reading Time	: 15 Minutes (prior to writing time)

GENERAL INSTRUCTIONS:

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO Parts: Part I & Part II**
Part I consists of 70 multiple choice questions of 1 (one) mark each, and
Part II consists of 7 short answer questions
4. All questions are COMPULSORY.
5. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
6. **All answers should be written with correct numbering of Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the correct Part and Question Number will NOT be evaluated and no marks will be awarded.**
7. Begin each Part in a fresh page of the Answer Booklet.
8. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
9. Use of any other paper including paper for rough work is not permitted.
10. **You must hand over the Answer Booklet/s to the Invigilator before leaving the examination hall.**
11. This paper has **13 printed pages**, including this instruction page.

GOOD LUCK

PART I

Multiple Choice Questions [70 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 71 (a). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Find the missing number in the sequence: 2, 5, 10, 17, __, 37.
 - a) 25
 - b) 26
 - c) 27
 - d) 28

2. What is the longest length a CAT5e Ethernet cable can be for maintaining proper signal quality
 - a) 50 meters
 - b) 100 meters
 - c) 125 meters
 - d) 150 meters

3. What is the key difference between IMAP and POP3?
 - a) POP3 stores emails on the server, IMAP stores emails on the client
 - b) POP3 deletes emails from the server after retrieval, IMAP keeps emails on the server
 - c) IMAP does not support folders, POP3 does
 - d) IMAP is used for sending emails, POP3 is used for receiving emails

4. Which technology is often used to create augmented reality experiences?
 - a) Computer Vision
 - b) GPS
 - c) 3D rendering
 - d) All of the above

5. A malicious code hidden inside a seemingly harmless piece of code is called _____
 - a) Trojan Horse
 - b) Virus
 - c) Worm
 - d) Malware

6. Which HTTP method is used to submit data to be processed to a specified resource?
 - a) POST
 - b) GET
 - c) PUT
 - d) PATCH

7. What is the purpose of virtual hosting on a web server?
 - a) To increase storage
 - b) To increase server response time
 - c) To provide database services
 - d) To run multiple websites on single server

8. Which of the following languages is commonly used for server-side scripting?
 - a) HTML
 - b) PHP
 - c) CSS
 - d) JavaScript

9. What is inheritance in the context of object-oriented programming?
 - a) The process of hiding data
 - b) The ability to create new classes based on existing classes
 - c) The mechanism to share data between different classes
 - d) The process of creating functions within a class

10. What does cardinality in an ERD indicate?
 - a) The number of attributes in an entity
 - b) The number of relationships between entities
 - c) The number of instances of one entity that can or must be associated with instances of another entity
 - d) The total number of entities in the diagram

11. Which type of attack involves intercepting and altering communications between two parties without their knowledge?
 - a) Man-in-the-Middle Attack
 - b) Denial of Service Attack
 - c) Brute Force Attack
 - d) SQL Injection

12. Which normal form requires that all attributes contain atomic values?
 - a) 1NF
 - b) 2NF
 - c) 3NF
 - d) BCNF

13. Which type of data analytics focuses on understanding historical data and trends?
- a) Diagnostic analytics
 - b) Prescriptive analytics
 - c) Predictive analytics
 - d) Descriptive analytics
14. Which of the following is a popular tool for data visualization?
- a) MySQL
 - b) R
 - c) Tableau
 - d) Python
15. What is the function of the HAVING clause in SQL?
- a) To filter records before grouping
 - b) To filter aggregated records after grouping
 - c) To sort the results of a query
 - d) To join two tables together
16. Which data structure is used for implementing a breadth-first search (BFS) in a graph?
- a) Stack
 - b) Linked List
 - c) Array
 - d) Queue
17. Which of the following IP address classes is used for multicast in IPv4?
- a) Class A
 - b) Class B
 - c) Class C
 - d) Class D
18. Which port number is used for SSH (Secure Shell)?
- a) 22
 - b) 23
 - c) 24
 - d) 25
19. Which command is used to display the files and folders in the current directory?
- a) SHOWDIR
 - b) DIR
 - c) PATH
 - d) DIRECTORY

20. What type of database architecture uses a single database server to serve multiple client applications?
- a) Centralized architecture
 - b) Cloud architecture
 - c) Distributed architecture
 - d) Federated architecture
21. At which layer of the OSI model does routing occur?
- a) Data Link layer
 - b) Network layer
 - c) Physical layer
 - d) Transport layer
22. Which technology is commonly used for secure online transactions?
- a) SSL (Secure Sockets Layer)
 - b) RFID (Radio Frequency Identification)
 - c) QR codes
 - d) NFC (Near Field Communication)
23. What does the term "single sign-on" (SSO) refer to in digital identity management?
- a) A process that requires multiple usernames and passwords for different services
 - b) A mechanism that allows users to authenticate once and gain access to multiple applications
 - c) A method of logging in using biometric data
 - d) A technique for managing physical access to buildings
24. Which of the following frameworks is commonly used for enterprise architecture?
- a) Agile
 - b) Six Sigma
 - c) Waterfall
 - d) TOGAF (The Open Group Architecture Framework)
25. Which document outlines the detailed specifications for a project, including functional and non-functional requirements?
- a) BRD
 - b) SRS (Software Requirements Specification)
 - c) Project Charter
 - d) Feasibility Study

26. A man took a loan from a bank at the rate of 8% p.a. simple interest. After 5 years, he had to pay Nu. 4000 interest only for the period. The principal amount borrowed by him was:
- a) Nu. 8,000
 - b) Nu. 1,000
 - c) Nu. 12,000
 - d) Nu. 10,000
27. What is the primary purpose of a VPN (Virtual Private Network)?
- a) To provide secure and encrypted communication over a less secure network
 - b) To increase the speed of internet connections
 - c) To filter and block unwanted websites
 - d) To manage network bandwidth usage
28. In an election between two candidates, one got 60% of the total valid votes, and 10% of the votes were invalid. If the total number of votes was 10,000, the number of valid votes that the other candidate got was:
- a) 3400
 - b) 3600
 - c) 3800
 - d) 4000
29. Which command is used to delete a table from a database?
- a) REMOVE TABLE CUSTOMER;
 - b) DROP TABLE CUSTOMER;
 - c) DELETE TABLE CUSTOMER;
 - d) UPDATE TABLE CUSTOMER;
30. Which government agency is mandated to carry out all functions related to ICT in the country?
- a) DITT
 - b) GovTech Agency
 - c) MOIC
 - d) Department of Information Technology
31. What does API stand for?
- a) Application Programming Interface
 - b) Advanced Programming Interface
 - c) Automated Program Integration
 - d) Application Process Integration

32. Which clause is used to sort the results of a query?
- a) SORT BY
 - b) ORDER BY
 - c) GROUP BY
 - d) None of the above
33. The sum of the first 20 natural numbers is:
- a) 180
 - b) 190
 - c) 200
 - d) 210
34. What is the difference between a digital signature and an eSignature?
- a) A digital signature is a handwritten signature scanned into a digital format, while an eSignature is an encrypted signature used for secure transactions.
 - b) A digital signature is a type of eSignature that uses encryption to provide security, while an eSignature is any electronic method of signing a document.
 - c) A digital signature is used exclusively for government documents, while an eSignature is used for commercial transactions.
 - d) A digital signature requires a physical device to create, while an eSignature can be created on any digital device.
35. What is the primary function of a firewall?
- a) To monitor network traffic
 - b) To block unauthorized access
 - c) To manage user permissions
 - d) To store data securely
36. A candy store owner had some apples. She sells 20% of the apples and still has 80 apples left. How much did she have originally?
- a) 90 apples
 - b) 100 apples
 - c) 120 apples
 - d) 140 apples
37. Which HTML tag is used to define an internal style sheet?
- a) <style>
 - b) <css>
 - c) <stylesheet>
 - d) <script>

38. Which of the following is a benefit of using cloud storage?
- a) Limited accessibility
 - b) High maintenance cost
 - c) Scalability and flexibility
 - d) Restricted data sharing
39. Which of the following is a NoSQL database?
- a) MySQL
 - b) Oracle
 - c) MongoDB
 - d) PostgreSQL
40. In cybersecurity, what is a 'phishing' attack?
- a) An attack that tries to trick users into revealing personal information
 - b) An attack that floods a network with traffic
 - c) An attack that infects computers with malware
 - d) An attack that decrypts sensitive data
41. If a file is 4MB in size and the upload speed is 1Mbps, how long will it take to upload the file?
- a) 32 seconds
 - b) 4 seconds
 - c) 8 seconds
 - d) 16 seconds
42. A user is experiencing slow performance on their computer. Which of the following is least likely to be the cause?
- a) Insufficient RAM
 - b) Malware infection
 - c) Fragmented hard drive
 - d) High-speed internet connection
43. Which network topology is most resilient to a single point of failure, and why?
- a) Star Topology
 - b) Bus Topology
 - c) Ring Topology
 - d) Mesh Topology
44. In a binary tree, what is a 'leaf' node?
- a) A node that has no children
 - b) A node that has one child
 - c) A node that has two children
 - d) A node that is the root of the tree

45. What is the primary purpose of RAID in computer storage?
- a) To provide data redundancy and improve performance
 - b) To reduce storage costs
 - c) To compress data
 - d) To encrypt data
46. Which of the following is an open-source operating system?
- a) Windows 10
 - b) macOS
 - c) Linux
 - d) Solaris
47. A company's network performance is degrading during peak hours. What is the best course of action to identify the issue?
- a) Increase the bandwidth
 - b) Monitor network traffic to identify the source of congestion
 - c) Upgrade the network hardware
 - d) Limit the number of users on the network
48. What is the primary function of a compiler?
- a) To execute program code
 - b) To translate source code into machine code
 - c) To debug program code
 - d) To edit program code
49. What is the main advantage of using cloud storage?
- a) Increased physical storage space
 - b) Easy data sharing and access from anywhere
 - c) Faster data retrieval
 - d) Improved data security
50. Which of the following is an example of a web server?
- a) Apache
 - b) MySQL
 - c) Oracle
 - d) MongoDB

51. What does the term 'open source' refer to?
- a) Software that is free to use
 - b) Software whose source code is available for modification or enhancement by anyone
 - c) Software that runs on multiple platforms
 - d) Software that is not proprietary
52. What is the main function of a proxy server?
- a) To act as an intermediary for requests from clients seeking resources from other servers
 - b) To store data
 - c) To execute program code
 - d) To compile application programs
53. What is the primary purpose of cache memory?
- a) To store frequently accessed data and instructions
 - b) To increase the permanent storage capacity
 - c) To protect data from unauthorized access
 - d) To manage network connections
54. In which layer of the OSI model does the HTTP protocol operate?
- a) Network layer
 - b) Transport layer
 - c) Data link layer
 - d) Application layer
55. What is the purpose of the 'ping' command in networking?
- a) To test the reachability of a host on an IP network
 - b) To measure the speed of a network connection
 - c) To configure network settings
 - d) To encrypt data
56. What does SEO stand for and what is its purpose?
- a) Secure Email Operation; To secure email communications.
 - b) Search Engine Operation; To manage search engines.
 - c) Search Engine Optimization; To improve website visibility in search engines.
 - d) System Engine Optimization; To optimize system performance.
57. Which of the following is not a common HTTP method used in RESTful APIs?
- a) SEND
 - b) GET
 - c) POST
 - d) DELETE

58. Which protocol operates at the Network layer of the OSI model?
- a) FTP
 - b) IP
 - c) HTTP
 - d) TCP
59. What is the default port for PostgreSQL?
- a) 3306
 - b) 1433
 - c) 1521
 - d) 5432
60. What does ETL stand for in the context of data processing?
- a) Extract, Transform, Load
 - b) Encode, Transfer, Load
 - c) Extract, Transfer, Link
 - d) Encode, Transform, Link
61. What is "ransomware"?
- a) A form of social engineering attack.
 - b) Software used to monitor network traffic.
 - c) Malware that encrypts a user's files and demands payment for the decryption key.
 - d) A type of phishing attack.
62. Which layer of the OSI model is responsible for establishing, managing, and terminating connections between applications?
- a) Physical Layer
 - b) Data Link Layer
 - c) Network Layer
 - d) Session Layer
63. Which of the following is a subfield of AI focused on enabling computers to understand human language?
- a) Machine Learning
 - b) Natural Language Processing
 - c) Autonomous AI
 - d) Computer vision

64. Which of the following keys combines two or more attributes to uniquely identify a record?
- a) Primary key
 - b) Foreign key
 - c) Composite key
 - d) Unique key
65. Which of the following is an example of artificial intelligence (AI)?
- a) A database management system
 - b) A weather forecasting model
 - c) A digital camera
 - d) An email client
66. Which of the following is a well-known platform for accessing open data?
- a) Data lake
 - b) Data warehouse
 - c) Data.gov
 - d) Amazon Cloud Service
67. What does "BCC" stand for in an email header?
- a) Blind Carbon Copy.
 - b) Blind Continuous Copy.
 - c) Blind Contact Copy.
 - d) Blind Central Copy.
68. Which of the following data structures is a LIFO (Last In, First Out) structure?
- a) Linked List
 - b) Queue
 - c) Stack
 - d) Binary Tree
69. What technology underpins Bitcoin and other cryptocurrencies?
- a) Cloud computing
 - b) Blockchain
 - c) Quantum computing
 - d) Artificial Intelligence
70. In which year was 5G launched in Bhutan?
- a) 2023
 - b) 2022
 - c) 2021
 - d) 2020

PART II

Short Answer Questions [30 marks]

Answer ALL 7 short answer questions. A mark for each question is indicated in the brackets.

1. What is a Web Application Firewall (WAF)? State two differences between WAF and traditional network firewall? **(4 marks)**
2. Given a table named complaints with columns user_id, complaint_id, and complaint_date, write an SQL query to only return users who have made more than three complaints. **(4 marks)**
3. Explain the differences between native and hybrid mobile applications. **(4 marks)**
4. What is Web 3.0 and list down any three key characteristics of Web 3.0? **(4 marks)**
5. Explain the difference between black-box testing and white-box testing. **(4 marks)**
6. What is an API key, and how is it used for authentication? **(4 marks)**
7. For the following sales data, answer the questions based on the data.

Month	Sales (Nu.)	Expenses (Nu.)
Jan	10,000	7,000
Feb	11,000	13,000
Mar	8,000	6,000
Apr	9,000	15,500
May	15,000	12,000

- I. Which type of graph would you use to compare the monthly sales over the six-month period? Explain your choice. **(2 marks)**
- II. To visualize the proportion of total sales contributed by each month, what type of chart would you choose and why? **(2 marks)**
- III. How would you graphically represent the overall comparison of total sales and total expenses over the five-month period? Explain your reasoning. **(2 marks)**

TASHI DELEK