S5 ICT Practice Paper: Computer Systems and Data Representation, Programming and Algorithms, Databases and SQL, Computer Networks and the Internet, Multimedia and Data Compression, Information Systems and Security

S5 | Information and Communication Technology | Time: 75 minutes | Total: 100 marks | 24 questions

---

Part 1: Computer Systems and Data Representation

Show your working; use 1 GB = 1 024 MB for capacity conversions.

1. Convert the binary number 11010110 into denary and give its hexadecimal form. [5]

2. A photograph takes about 4 MB. How many such photographs fit on a 5 GB card? [5]

3. How many colours can 8-bit and 24-bit colour depth represent? How many times more is the latter than the former? [5]

4. An uncompressed stereo recording is sampled at 44 100 Hz with 16-bit depth for 60 seconds. What is its approximate size in MB? [5]

Part 2: Programming and Algorithms

Pseudocode or a variable trace table is acceptable; state the final output.

5. total <- 0; for i <- 1 to 10 do total <- total + i. What is total at the end? [4]

6. total <- 0; for i <- 1 to 5 do total <- total + i * i. What is total at the end? [4]

7. A binary search runs on the sorted integers 1 to 1 000. What is the maximum number of comparisons needed? [5]

8. Bubble sort is applied to 6 items stored in exactly reverse order. How many passes are needed? [5]

Part 3: Databases and SQL

Give the value or the SQL statement only; no syntax explanation is required.

9. A table holds 5 000 records but only 4 800 distinct student numbers. If the student number is the primary key, how many records are duplicates? [4]

10. The score column holds 45, 58, 60, 72, 88 and 59. What does SELECT COUNT(*) FROM students WHERE score >= 60 return? [4]

11. Table A has 4 rows and table B has 5 rows joined on an equality condition. Exactly 12 pairs match, how many rows does the result hold? [4]

12. An unnormalised table stores the marks of 6 students in 3 subjects inside one row. After splitting into a student table and a subject table, how many rows are there? [4]

Part 4: Computer Networks and the Internet

Give transmission times in seconds to two decimal places.

13. A subnet uses a /26 mask. How many usable host addresses does each subnet provide? [4]

14. A 5 MB file is sent over a 10 Mbps link. Ignoring overhead, what is the minimum time in seconds? [4]

15. State the default port numbers for HTTP, HTTPS, SMTP and DNS. [4]

16. Four computers are wired as a full mesh. How many cables are needed? How many if they are instead connected to one central switch? [4]

Part 5: Multimedia and Data Compression

Give sizes in MB to two decimal places and state whether the data is compressed.

17. A 1 920 x 1 080 image at 24-bit true colour: what is its uncompressed size in bytes and in MB? [4]

18. The same image compresses to 622080 bytes. What is the compression ratio and the saving in per cent? [4]

19. A 44 100 Hz 16-bit stereo recording lasts 180 seconds. Give its uncompressed size in bytes and in MB. [4]

20. A video encoded at 8 Mbps runs for 120 seconds. What is its approximate size in MB? [4]

Part 6: Information Systems, Security and Society

Short answers are acceptable; show the formula where a calculation is involved.

21. Of 250 000 accounts on a site, 10 000 are leaked. What percentage is that? [4]

22. How many 4-digit PIN combinations exist? If only 3 attempts are allowed, what is the maximum chance of a random guess succeeding? [4]

23. Explain the 3-2-1 backup rule and state which risk it addresses. [3]

24. An organisation receives 500 emails, 75 of which are phishing. What percentage is that, and which single control is most effective? [3]