S4 Information and Communication Technology Practice Paper 4

S4 | Information and Communication Technology | Time: 60 minutes | Total: 100 marks | 24 questions

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Part A: Data Representation and Binary (16 marks)

Show all working; write binary answers with all 8 bits.

1. Convert the binary number 10110110 to a denary number.

2. Convert the denary number 205 to an 8-bit binary number.

3. Write the 8-bit two's complement representation of -46.

4. An uncompressed 24-bit true colour image is 1920 x 1080 pixels. What is its file size in MB? (1 MB = 2^20 bytes, 2 decimal places)

Part B: Algorithms and Trace Tables (16 marks)

Show the trace; answers must match the trace table.

5. A bubble sort in ascending order is applied to [5, 2, 9, 1]. Write the array after the first pass.

6. A linear search is performed on an unsorted array of 100 elements. How many comparisons are needed in the worst case?

7. A binary search is performed on 1,000 sorted elements. How many comparisons are needed in the worst case? (whole number)

8. A recursive function is defined by f(0) = 0, f(1) = 1 and f(n) = f(n-1) + f(n-2). Find f(6).

Part C: Programming and Debugging (17 marks)

Answer in Python syntax; for the debugging question state the fault and the correction.

9. In Python, what are the values of 7 // 2 and 7 % 2?

10. What is the value of total after this code runs? total = 0; for i in range(1, 5): total += i

11. Given s = "TutorZone", what is the value of the slice s[:5]?

12. A program should test whether a score is a pass (from 50 to 100) with if score > 50 or score < 100. With score = 120 it wrongly reports a pass. State the cause and write the correct condition.

Part D: Databases and SQL Queries (17 marks)

Write SQL keywords in capitals; use the record counts given in each question.

13. A student table holds 12 records, 5 of which have form = "S4". How many rows are returned by SELECT * FROM students WHERE form = "S4"?

14. An orders table has 10 records with amount values 200, 650, 700, 450, 900, 300, 550, 120, 800 and 1000. What does SELECT COUNT(*) FROM orders WHERE amount > 500 return?

15. What order does SELECT mark FROM results ORDER BY mark DESC output for the mark values 45, 88 and 72?

16. Explain the difference between a primary key and a foreign key, giving one example of each.

Part E: Computer Networks and the Internet (17 marks)

Show the working; write IP addresses in full four-part form.

17. What is the CIDR prefix length of the subnet mask 255.255.255.192?

18. How many usable host addresses does a subnet with a /26 mask provide?

19. An IP address 192.168.10.130 uses a /26 mask. What is its network address?

20. A computer can ping 127.0.0.1 successfully but cannot ping another computer on the same subnet. Give two possible reasons.

Part F: System Development and Project Management (17 marks)

Answer in full sentences; show the calculation where required.

21. List the five stages of the system development life cycle (SDLC).

22. A project has four tasks taking 3, 5, 2 and 4 days; tasks 2 and 3 can run in parallel while the rest must run in sequence. What is the shortest total duration in days?

23. What is the purpose of user acceptance testing (UAT)?

24. A system has 3 modules with 40 test cases each, and 96 cases have passed. Find the pass rate as a percentage.
