S5 ICT Practice Paper 1 with Answers

ICT · S5 · Data-response

S5 ICT paper on hex conversion, file sizes, network transfer time, spreadsheets, databases, algorithm steps and password strength; 6 questions, 100 marks, with answers.

1. Number systems and file size (16 marks)

A student uploads a 90-second music clip and a photo to the school server. The audio is sampled at 44.1 kHz with a 16-bit sample size, mono; the photo is 1920 x 1080 pixels with a 24-bit colour depth.

#	Question
1	Convert the hexadecimal value 2F5A to decimal.
2	Find the raw size of the WAV file in bytes and in MiB (1 MiB = 1048576 bytes).
3	Find the uncompressed size of the photo in MiB.
4	The same audio is stored as a 128 kbps MP3. Find the MP3 size, the compression ratio and the percentage of the original size.

2. Network transfer and bandwidth (18 marks)

The school link is 100 Mbps. A 400 MB file took 40 seconds to upload. A mobile plan allows 200 GB per month; extra data costs $12 per GB.

#	Question
5	Ignoring overhead, what is the theoretical upload time in seconds?
6	Find the actual throughput in Mbps and the transmission efficiency in per cent.
7	Each day the user uploads 1.5 GB and downloads 6 GB, for 30 days. Find the total usage and the excess charge.
8	A 4 GB video is downloaded over a 1000 Mbps fibre link and a 200 Mbps 5G link. How long does each take, and what is the difference?

3. Spreadsheet formulas and weighted average (16 marks)

Cells B2:B6 hold five quiz scores: 45, 52, 61, 38 and 74. A second sheet compares last year (240) with this year (270), and totals weighted marks of 30%, 30% and 40%.

#	Question
9	Write the formulas for the total and the mean, and give both values.
10	Fill =IF(B2>=50,”Pass”,”Fail”) down the column; find how many pass and list their scores.
11	Find the percentage increase from 240 to 270.
12	Three papers score 62, 58 and 70 with weights 30%, 30% and 40%. Find the weighted mean.

4. Database queries and relations (16 marks)

The score column of the student table holds 55, 62, 78, 90, 48 and 66 in 6 records; a further 240 student records must store a class name.

#	Question
13	Explain why a student ID is a better primary key than a name.
14	Run SELECT COUNT(*) FROM student WHERE score >= 60. What is the result?
15	Run SELECT * FROM student ORDER BY score DESC LIMIT 2. Give the two scores and their mean.
16	If a class name takes 12 bytes, how many bytes are saved on 240 records by using a 4-byte foreign key instead?

5. Algorithms and program tracing (18 marks)

*A program runs total = 0, then for i in range(1,6): total = total + i*i. Another program halves n by integer division until n = 1.*

#	Question
17	Trace the first program and give the final value of total.
18	With n = 1000, how many divisions does the second program perform?
19	For 1024 sorted items, what are the worst-case comparisons of linear search and binary search, and what is the ratio?
20	A doubly nested loop runs n times at each level. With n = 50, what is the total number of operations, and how many times more than a single loop?

6. Information security and backup (16 marks)

A site requires 8-character passwords drawn from upper case, lower case and digits (62 characters). The server changes 3 GB of data each day, and backup compression is 4:1.

#	Question
21	Compute the entropy of such a password in bits, to one decimal place.
22	How many 4-digit PINs are there? At 100 tries per second, how long to try them all, and on average?
23	Explain why a site stores password hashes instead of plain text, and how two-factor authentication limits a leaked password.
24	Find the compressed size of 30 daily backups; if two off-site copies are kept, what is the total storage?