

義守大學 94 學年度研究所碩士在職專班考試試題

系所別	資訊工程學系	考試日期	94/4/23
考試科目	計算機概論	總頁數	

※此為試題卷，請將答案填寫在答案卷內，未寫於答案卷內者，不予計分。

※不可使用計算機

選擇題: (40%)

1. Given the Fibonacci sequence of numbers: $F(1)=1$, $F(2)=1$ and $F(n)=F(n-1)+F(n-2)$, the value of $F(10)$ = (a) 34 (b) 55 (c) 89 (d) 1.
2. For the following statements the universe comprises all nonzero integers.
Which statement is true. (a) $\exists x \forall y [xy = 3]$; (b) $\forall x \exists y [xy = 5]$; (c)
 $\exists x \exists y [(2x + y = 7) \wedge (x - 3y = 0)]$ (d) $\exists x \exists y [(2x + y = 1) \wedge (x - 3y = 1)]$
3. Which description is wrong in the following?
(a) The time complexity of binary search in best case is $O(n)$.
(b) The time complexity of selection sort in best case is $O(n^2)$.
(c) The time complexity of selection sort in worst case is $O(n^2)$.
(d) The time complexity of quick sort in average case is $O(n \log n)$.
4. How many edges should be needed for a complete graph with 4 nodes?
(a) 2 (b) 4 (c) 6 (d) 16
5. Which layer does not belong to the five-layer TCP/IP internet protocol ? (a) physical layer (b) network layer (c) transport layer (d) security layer
6. We use run-length encoding to compress the following text stream:
xxxxyyyyyyzzzzAAxxxx
What is the compression ratio? (a) 1/1 (b) 19/5 (c) 19/15 (d) 19/10
7. (5%) Use the binary search algorithm to decide whether 35 is in the following list:
3, 7, 9, 18, 21, 22, 31, 43
What numbers will be compared to 35? (a) 18,22,31,43 (b) 3, 7, 9, 18 (c) 18, 31 (d) 31, 43
8. Using MP3, which samples 44100 times per second using a bit depth of 16 bits per sample, how many bits are required to store a 3-minute song in uncompressed format? (a) $44100 \cdot 16 \cdot 3$ (b) $44100 \cdot 16 \cdot 3 \cdot 60$ (c) $44100 \cdot 16 \cdot 3 \cdot 60 / 3$ (d) $44100 \cdot 3 \cdot 60 / 16$

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問答與計算題 (60%)

1. (10%) Using the RSA encryption algorithm, pick $p=11$ and $q=7$. Find a set of encryption/decryption keys e and d .
2. (10%) Rank the following functions by order of growth.
 $n, n^2, n^{1+\sin n}, \log n, \sqrt{\log n}, n!, (\log n)^{\log n}, n^{\log \log n}, n^{1+\epsilon/\sqrt{\log n}}, \epsilon > 0$
3. (10%) Assume that our memory unit was organized as a 1024×1024 two-dimensional array.
 - (a) How big would the MAR register have to be?
 - (b) If the average access time of this memory were 25 nsec and the average access time for cache memory were 10 nsec, what would be the overall average access time if our cache hit rate were 90%?
4. (15%) Assume that programs spend about 25% of their time waiting for I/O operations to complete. If there are two programs loaded into memory, what is the likelihood that both programs will be blocked waiting for I/O and there will be nothing for the processor to do? What percentage of time will the processor be busy? (This value is called **processor utilization**.) By how much does processor utilization improve if we have four programs in memory instead of two?
5. (15%) Design a circuit that implements a 1-bit compare-for-greater-than (1-GT) operation. This circuit is given two 1-bit values, a and b . It outputs a 1 if $a > b$ and outputs a 0 otherwise.