

臺中健康暨管理學院九十一學年度碩士班暨碩士在職專班招生考試試題紙

系 所 別	組 別	考試科目	考試日期	時 間	備 註
資訊科技與管理研究所 碩士班		離散數學	4月7日	10:30 ~ 12:10	

- Let $A = \{1, 2, 3, 4, 5, 6\}$ and R be the relation defined on A by $a R b$ if and only if $a < b$.
 - Compute R^2 and R^3 . (6%)
 - Complete the following statement: $a R^2 b$ if and only if _____. (2%)
 - Complete the following statement: $a R^3 b$ if and only if _____. (2%)
- What is the last digit in 3^{2001} ? (5%)
 - What is the last digit in 7^{2001} ? (5%)
- Prove each of the following by mathematical induction.
 - $\sum_{i=1}^n \frac{1}{i(i+2)} = \frac{1}{2} \left(\frac{3}{2} - \frac{1}{n+1} - \frac{1}{n+2} \right)$ (5%)
 - $\sum_{i=1}^n i^3 = \frac{n^2(n+1)^2}{4}$ (5%)
- Solve the congruence $3x \equiv 7 \pmod{29}$. (10%)
- Find the number of ways of distributing 10 pears and 6 oranges to 3 children so that each child can get at least 1 pear and at most 2 oranges. (10%)
- Solve the recurrence relation $a_{n+2} = 6a_{n+1} - 9a_n$, $n \geq 0$, $a_0 = 2$, $a_1 = 6$. (10%)
- In the following functions, each function is of order n^k . What is the smallest such real number k ?
 - $\log_{10}(n) + 4\sqrt{n}$ (5%)
 - $\frac{n^4 + 4n^3 - 9}{n^2 + 10n}$ (5%)
- There are 9 coins, one of which is known to be heavier or lighter than the rest. Using a two-pan scale, we must find the counterfeit coin and determine whether it is light or heavy in no more than 3 tests. (10%)
- Explain the characteristics of an Eulerian circuit. (5%)
 - Explain the characteristics of a Hamiltonian path. (5%)
- A connected, planar graph has seven vertices having degrees 2, 2, 2, 3, 3, 5 and 5. How many edges are there? How many regions(faces) are there? (10%)